Southern Power & Industry

The Industrial and Power Journal of the South and Southwest

OCTOBER, 1959

Better Production

Case Studies - - - - See Page 3

Above: After welding together two sections of volute (one shown below) the areas adjacent to the welds are high frequency induction heated to 1950°F. prior to quenching.

Below: Section of volute which is fabricated entirely of Stainless Steel Type 316, for handling of liquid metal at 1250°F.

Stainless Steel Volute for liquid metal...

fabricated by Pittsburgh Piping

This stainless steel volute was fabricated by Pittsburgh Piping for a leading builder of nuclear energy equipment. The job was awarded to us because we have highly specialized facilities, plus broad experience in nucleonic piping work. This experience began when we fabricated piping for the Nautilus and for the main coolant lines of the Shippingport atomic-powered central station. It has been extended and expanded through the work we have been doing for the atomic-powered submarine and surface vessels now being built, and for scores of government and industrial nuclear energy installations. Use this experience on your next nucleonic piping job. Our representative will call on request, or we will be glad to have you visit our plant.

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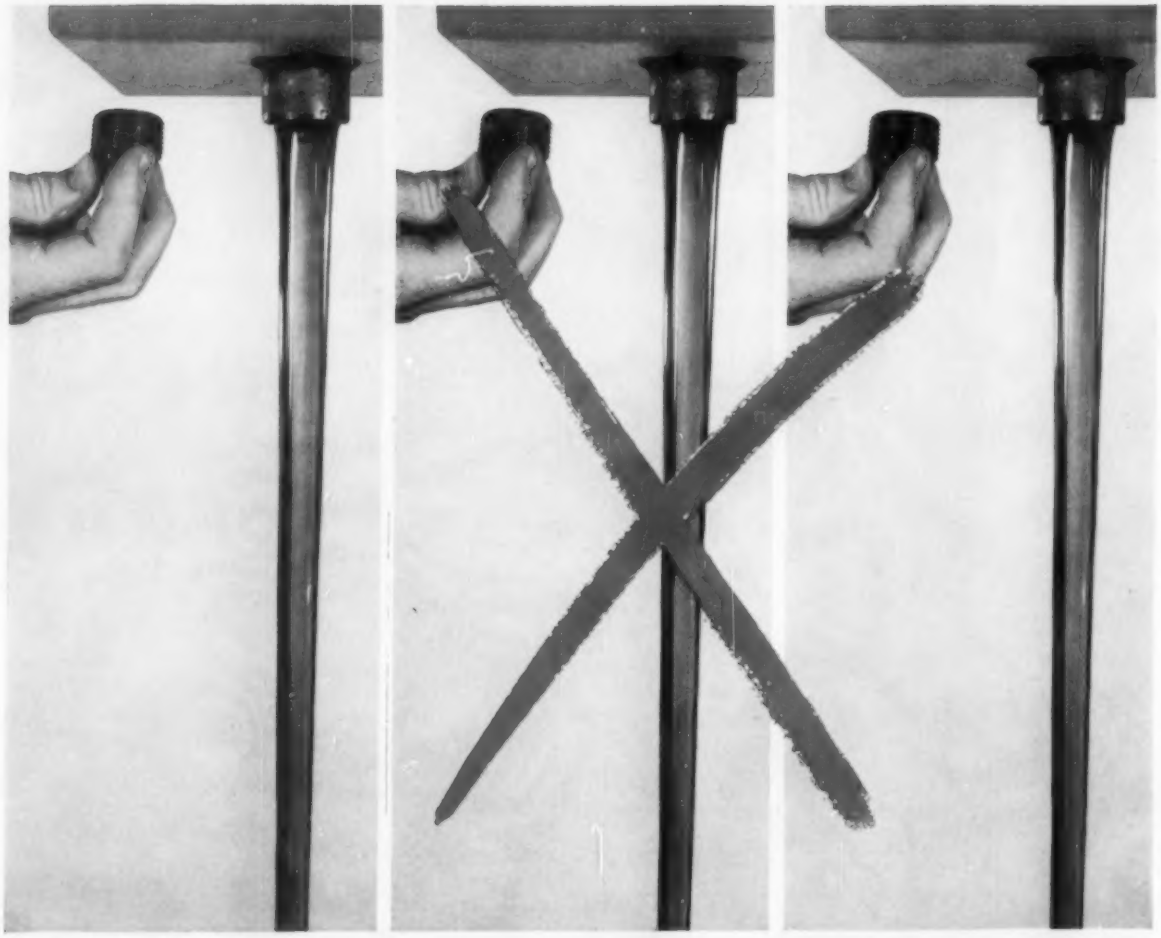
Volume 77 Number 10



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(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

Southern Power & Industry

The Industrial and Power Journal of the South and Southwest

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No. 10

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Facts and Trends

October 1, 1959

◆ MORE TURBINE-GENERATORS — A progressive improvement in the placement of orders for large capacity steam turbine-generator units by the nation's electric utilities is reported by W. S. Ginn, General Electric Vice President.

Mr. Ginn reported that in the first seven months of this year G-E's Large Steam Turbine-Generator Department received contracts for units with a total capacity of over 2,000,000 kilowatts. He compared this total to last year when all companies which manufacture such machines received orders for less than two million kilowatts — making 1958 one of the worst order years in recent history.

◆ ABOUT PLEXIGLAS — "Fabrication of Plexiglas" is a new 34-page "How to . . ." handbook on the subject now available from Commercial Plastics & Supply Corp.

The convenient pocket-size booklet first introduces Plexiglas by describing what it is, enumerates its many industrial plant applications, then outlines the characteristics that have made the acrylic one of today's best sellers. Profusely illustrated throughout with cross-sectional drawings, the new handbook will be helpful to the purchasing agent as well as the design and maintenance engineer.

◆ ELECTRONICS — A highlight of the 15th Annual National Electronics Conference program of 28 sessions and over 125 papers will be a set of concurrent panel meetings on Recruiting of Scientific Personnel, Problems in Circuit Theory, and Education for Leadership, said Virgil H. Disney, NEC president. These panels will be held the first night of NEC, scheduled for October 12 to 14, 1959 at the Hotel Sherman, Chicago. Over 13,000 professional people concerned with latest advances in electronics are expected to attend.

◆ UNFAIR TO HORN WORMS — Dr. C. H. Rogers, tobacco specialist with the 57-year-old Coker Pedigreed Seed Company of Hartsville, S. C., reports that his firm has experienced success with a unique electric "bug light" that stops the tobacco horn worm even before it is born.

The light is outstanding in its simplicity. Its illumination is a new "black light" which has slight attraction for human vision but is an irresistable beacon for night fliers like the horn worm moth. Behind the light's circular illuminated tube is a suction fan. As the moth nears the light he is drawn through the opening and deposited in a fine mesh bag.

◆ ZIRCONIUM — Expanded zirconium sheet, newest corrosion resistant material available to the chemical and plating industries, has been announced by Mallory-Sharon Metals Corporation.

The new zirconium expanded sheet supplements the company's line of titanium expanded sheet. In the main, zirconium expanded sheet provides corrosion resistance against particularly strong or hot phosphoric, hydrochloric, or sulfuric acid solutions.

(Continued on Page 6)

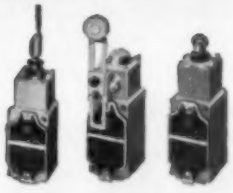
AUTOMATION BEGINS HERE

. . . Insist on Allen-Bradley accessories for continuous automatic production

In this broad line of Allen-Bradley accessories, each and every unit carries the traditional A-B trademark of *quality* that stands for trouble free operation. Rugged construction, and maintenance free, silver alloy contacts provide the reliability that is essential to the continuous operation of *your* automatic production machines.

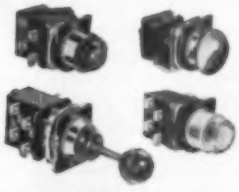
Profit from the experience of the leading machine tool builders . . . insist on Allen-Bradley *quality* motor control *all the way!*

▲ Special push button panels can be assembled to your specifications.

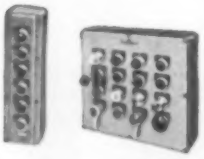


OILTIGHT LIMIT SWITCH
Bulletin 802T with sealed heads and bodies. Various operators.

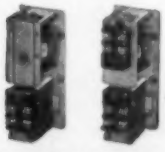
PRECISION LIMIT SWITCH
Bulletin 802 oiltight. Responds to very small operator travel.



OILTIGHT CONTROL UNITS
Bulletin 800T. Choice of push buttons, lights, and switches.



OILTIGHT CONTROL STATIONS
Bulletin 800T for up to 16 units in die cast aluminum enclosure.



PNEUMATIC TIMERS
Bulletin 849. Reliable and accurate. For on-delay or off-delay.

OILTIGHT PRESSURE CONTROL
Bulletin 836. For hydraulic systems with pressures to 5000 psi.

STANDARD DUTY PUSH BUTTONS
Bulletin 800. Up to three units, also pilot lights and switches.

FOOT SWITCH
Bulletin 805. In rugged die cast housing for toughest service.

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SAN DIEGO—James A. Satchell, 301 W. "G" St., Tel: BElmont 3-3981
SHREVEPORT—Curtis H. Stout, Inc., 334 Ricou-Brewster Bldg., Tel: 5-5485
TULSA—John W. Elder Co., 1526 East Fourth St., Tel: Diamond 3-9149

Facts and Trends — Continued from Page 4

◆ FAST DRY-OUT — The harmful effects of moisture in electrical equipment are now claimed to be eliminated by the application of CRC Moisture Inhibitor, a chemical liquid which drives out absorbed moisture and keeps it out.

The manufacturers, Corrosion Reaction Consultants, Inc., report that CRC eliminates the effect of wicking and reduces electrical failures and costly downtime. Electrical characteristics, which deteriorate in moist and humid atmospheres, are fully restored even in equipment that has been totally submerged.

◆ GASKET MATERIAL — A new class of gasket materials consisting of (Armalon) TFE-fluorocarbon felts that have been impregnated with (Teflon) TFE-fluorocarbon resin is described in a new technical bulletin of Du Pont Fabrics Division.

Properties, potential uses, case histories and availability, together with a table of physical properties, are included in the bulletin. Impregnated felts of Teflon will withstand temperatures from below minus 100 F to plus 400 F. Capable of withstanding attack by strong acids, they are unaffected by water or any of the common fuels.

◆ ELECTRICAL CODE – The new 1959 National Electrical Code is now in print and available, it has been announced by its sponsor, the National Fire Protection Association.

The 1959 Code is a complete revision of the previous edition issued in 1956. The official text, now published by NFPA, has 528 pages and incorporates a substantial number of important new electrical safety provisions adopted at the recent NFPA annual meeting. There have been extensive editorial revisions and clarifications of the text. One dollar per copy from the National Fire Protection Association, 60 Batterymarch St., Boston 10, Mass.

◆ ALUMINUM CONSTRUCTION — Published by The Aluminum Association, 420 Lexington Ave., New York 17, N. Y. 390 pages, 6 x 9, $3.00. Reference book for use by engineers, designers, architects and students concerned with the use of aluminum in stressed structures; includes allowable load data for aluminum alloy 6061-T6.

◆ BETTER PLASTICS – The possibility of achieving greater strength and improvement of electrical properties in commercial plastic materials through electrical field processing has been advanced by scientists of Armour Research Foundation.

Preliminary experimentation has shown that processing a commercial plastic such as polystyrene in an electrical field at the same time it is subjected to external heating increases the tensile strength approximately 25 per cent.

◆ DIAMONDS — Man-made diamond abrasive products have come of age competitively. The Carborundum Company, first to fabricate The General Electric Company's man-made diamonds into abrasive wheels, and a pioneer in their introduction to the abrasives market, has announced that its man-made diamond abrasive products are now sold, wheel for wheel, at the same price as natural diamond products.

◆ LEASING AUTOMOBILES — A new study for executives and financial officers analyzes the advantages and disadvantages of leasing auto fleets for company salesmen in cities and over-the-road. The study does not deal with truck leasing.

(Continued on Page 10)

How Much Steam Should a Steam Trap Trap?

. . . some answers to commonly asked questions about the primary job of a steam trap

You don't need a doctor's degree in thermodynamics to answer the question at the top of this page. Naturally, a steam trap should trap *all* the steam.

Unfortunately for you, the problem isn't quite that simple. After all, a shut off valve would trap all the steam . . . and condensate, and air, and carbon dioxide as well.

So we'd better amend the answer to the question this way: A steam trap should trap *all* the steam but *must* remove condensate, air and carbon dioxide as rapidly as they accumulate.

With this established, let's take a closer look at what's involved:

A Steam Trap Should Trap All The Steam

If you've had experience with several different makes of traps, you already know that some trap steam better than others. The operating principle of the trap is what makes the difference. We like to talk about it because Armstrong traps are designed so that no steam can get to the orifice. The valve is always water sealed. Result: *More efficient steam utilization, lower fuel costs.*

A Steam Trap Should Remove Condensate

All traps remove condensate—after a fashion. For maximum efficiency in the unit being drained, though, the trick is to get it out without waiting for it to cool and without leaking steam.

Armstrong's water sealed valve takes care of steam leakage. The inverted bucket operating principle opens the trap for water regardless of its temperature. This means you get the condensate out as quickly as it accumulates. Result: *Higher temperatures and better heat transfer in steam heated units.*

A Steam Trap Should Remove Air and CO_2

Part and parcel of the condensate removal problem is removal of air as well as oxygen and carbon dioxide—two real troublemakers. Air tends to reduce operating temperatures and interfere with heat transfer. CO_2 goes into solution to form corrosive carbonic acid which, for example, can eat unit heater tubes. O_2 aggravates the situation. Believe it or not, but all traps don't properly remove air and CO_2.

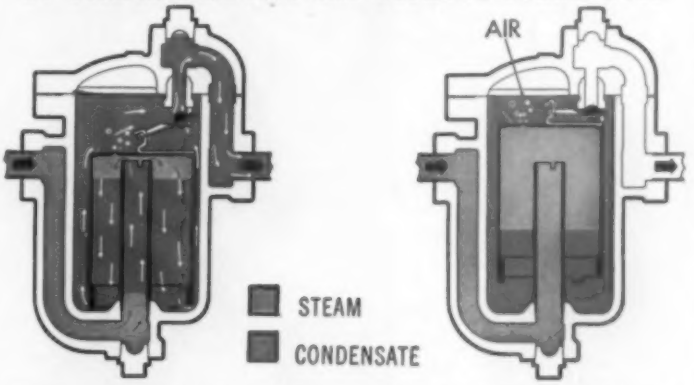
By now, you've probably guessed that Armstrong traps *do* remove air and CO_2. Armstrong design (see illustration) provides continuous venting of air and CO_2. By opening suddenly, the Armstrong trap creates a momentary pressure drop to "pump" the air down to be vented. Result: *Higher temperatures, faster heat-up, better heat transfer and reduced corrosion.*

Note: When required, specially sized air vents are furnished. For fast heat-up of low pressure on-and-off units, Armstrong provides open float and thermostatic air vent traps.

What's the Final Answer?

Summing it all up, you'll get the best service from steam heated units that are equipped with traps designed to trap *all* the steam and remove air and condensate as quickly as it accumulates. In our prejudiced viewpoint, this means Armstrong traps. More important are the several thousand users of Armstrong traps who have proved the point.

HERE'S THE STEAM TRAP DESIGN THAT GETS RID OF CONDENSATE AND AIR WITHOUT STEAM LOSS



Trap open. Condensate entering trap has caused bucket to lose buoyancy. Weight of bucket times leverage pulls valve open. Air is discharged along with condensate.

Trap closed. Steam has floated inverted bucket; valve is held tightly closed by system pressure. Air entering trap passes through bucket vent and accumulates at top of trap.

Before you make up your mind, though, consider the minimum maintenance requirements of Armstrong traps . . . and the convenient assistance your local Armstrong Representative provides. These are important plus values.

Put Up or Shut Up

We're so confident that we "put up". Armstrong traps are unconditionally guaranteed to satisfy. So you can find out for yourself with practically no risk. If you're not completely satisfied with the way they do their job, you can get your money back.

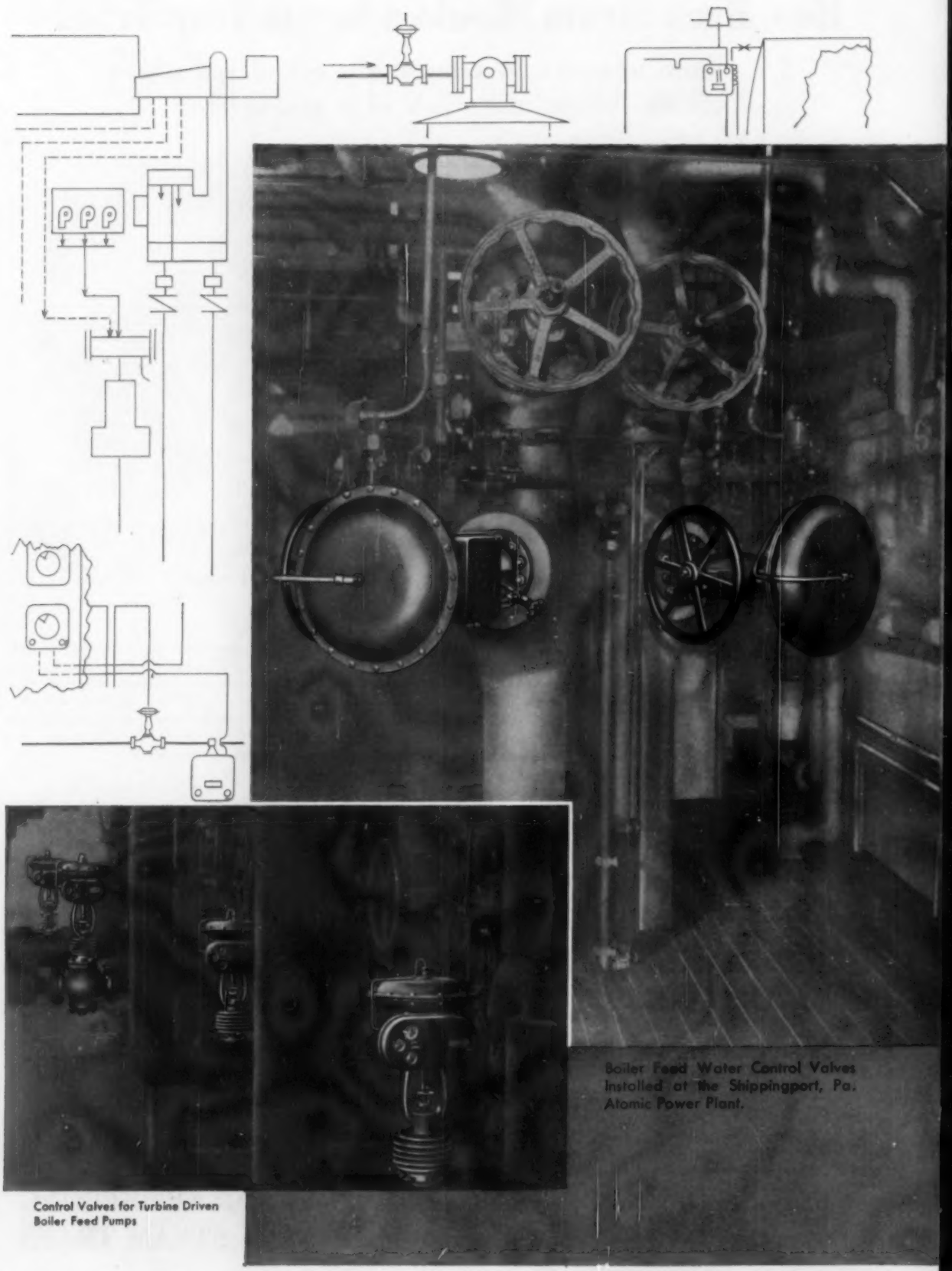
* * *

The 44-page Armstrong Steam Trap book goes into greater detail on these and other Armstrong features. It also discusses trap selection, installation and maintenance. Ask your Armstrong Representative for a copy or write

Armstrong Machine Works
8065 Maple Street
Three Rivers, Michigan

ARMSTRONG STEAM TRAPS

SEE OUR CATALOG IN "SWEET'S PLANT ENGINEERING FILE"



Boiler Feed Water Control Valves Installed at the Shippingport, Pa. Atomic Power Plant.

Control Valves for Turbine Driven Boiler Feed Pumps

VERSATILITY OF STANDARD MASONEILAN CONTROLS

Key to Dependability and Economy in Power Plant Operation

The wide variety available in standard Masoneilan Controls, plus adaptability to special conditions (often through interchangeability of unit sub-assemblies), simplifies the selection and maintenance problems of engineers concerned with power generation and power services. For example: —

CONTROL VALVES . . . body and trim types are designed to permit a maximum of interchangeability; full or reduced capacity; with percentage or linear characteristics as required. Advanced design butterfly types are also available with wide choice of actuators, and soft and angle seating.

LEVEL CONTROLLERS . . . units for proportional, proportional-reset, differential-gap control, or for pneumatic transmission, or combinations of any two of these in a single case. Also a complete variety of vessel mounting types.

PNEUMATIC CONTROLLERS . . . non-indicating, indicating and recording instruments for controlling pressure, temperature and flow. Features include unit sub-assemblies for wide choice of function and variety of action.

TRANSMITTERS . . . for pressure, temperature, flow and level, providing accurate remote measurement and pneumatic transmission; featuring a number of exclusive advantages.

Versatility designed into standard Masoneilan products helps to achieve accurate, dependable control with simplicity and economy. It can be profitable to you.

For details call a Mason-Neilan representative, or write:

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Level Controllers on Condenser Hotwell

Control Valve in Feedwater Starting Service

MN9-B1

Facts and Trends — Continued from Page 6

The 24-page study includes full charts which analyze costs involved in different fleet plans. Single free copies are available by writing to the Foundation for Management Research, 121 West Adams St., Chicago 3, Illinois.

◆ PARKING LOTS — Six parking lot layout templates have been prepared by Maintenance Inc., Wooster, Ohio, and are available free from that company.

These are suitable for use in planning practically any type of parking arrangement. Two templates provide for 45 degree parking, two for 60 degree, and two for 90 degree. Each permits safe, convenient placement of the maximum number of cars in any area.

◆ TITANIUM — As strong as steel and half as heavy, titanium is the fourth most plentiful structural metal found on earth. But because of the difficulties in removing it from its ore, titanium metal has been commercially available only for the past ten years and sells at about $9 a pound in the form of bar and sheet stock.

Ductile titanium can now be made in a newly developed electrolytic process which gives promise of making the metal less expensive. The process was developed by a team of Norton Company research men.

◆ TOO MUCH TOGETHERNESS — Sixty per cent of the 102 companies responding to a survey recently released by the National Industrial Conference Board report that they place limitations on the number and rank of executives flying together.

The Board finds, however, that formal written provisions regarding this practice are the exception rather than the rule, with only 10 per cent of the respondents saying that they have written policies.

◆ HOT SPRINGS — A precipitation hardened super-alloy cobalt wire has been introduced by National-Standard Company for forming springs to operate at ambient temperatures from 400 F to 1400 F.

◆ BIG JOB — Rockwell Manufacturing Co. has announced the formation of a new executive department—Governmental Relations—with the responsibility of keeping abreast of legislative, political and tax affairs in the United States and throughout the world.

I. C. Rowe, formerly corporate secretary, has been named to direct the job described by Rockwell management as "a new, increasingly important and significant phase of modern corporate business relations." W. F. Rockwell, Jr., president, pointed out that industry now has a heavy obligation to devote its fullest efforts in the legislative, political and tax areas — for the benefit of employees and shareholders.

◆ ALUMINUM WRENCHES especially designed to meet high strength requirements are being manufactured by Schick Products, Inc.

The wrench is the first of its type forged wholly from aluminum bar stock to meet U. S. Standards GGG-W-651C for heavy duty strength requirements, and Mil-W-1976 for maximum safety, according to the company.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 PEACHTREE St., N.E. Atlanta 8, Ga.

BRAXON internal feedwater treatment

BRAXON is a specially formulated feedwater treatment that conditions water so as to remove and prevent scale formation and corrosion in boilers. BRAXON bases its effectiveness on phosphate and carbonate control . . . maintaining the proper alkalinity and softness in the feedwater. Special BRAXON formulas inhibit the tendency of some feedwaters to produce foaming and carryover. No single formula can be applied successfully to all the various types of boiler feedwater. BRAXON formulas are prepared specifically for use in *YOUR* plant after a careful analysis and study of raw water used. Your BRAXON formula will keep your boiler operating at top efficiency, eliminating shut-downs and repairs caused by corrosion and scale.

Write today and request an Anderson service engineer to make an analysis and recommendations on your plant's water treatment. There's no cost for this service.

SPECIALISTS IN MAKING WATER BEHAVE

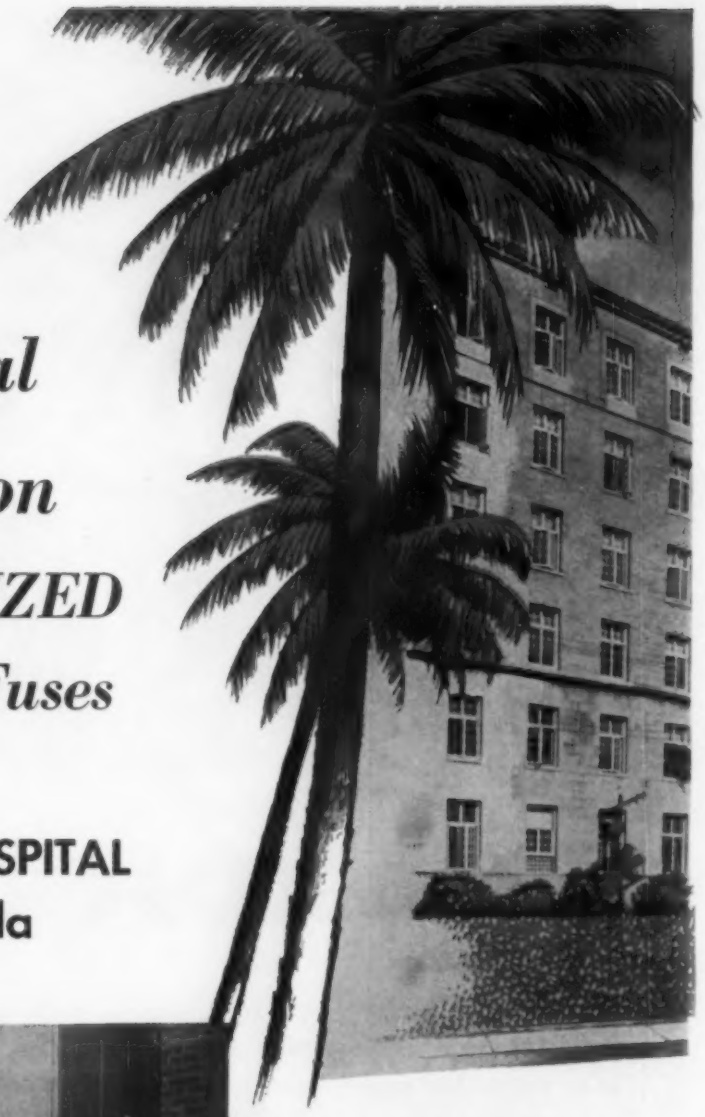
Anderson Chemical Company, INC.

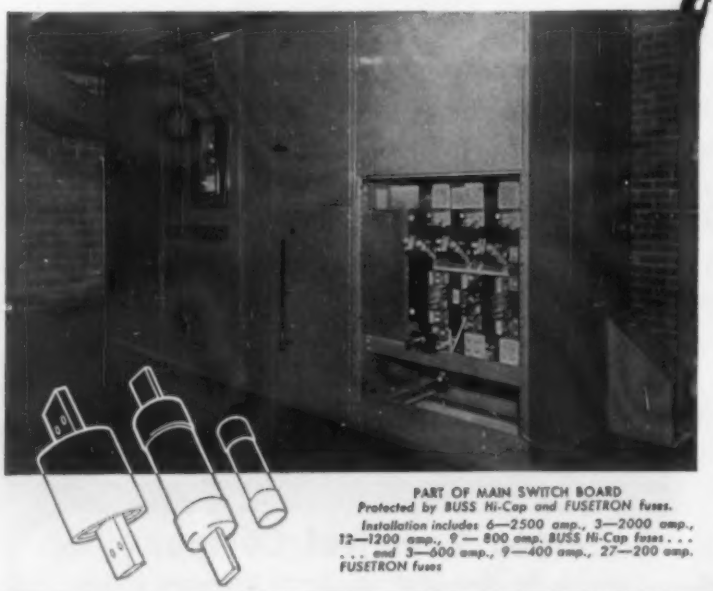
Macon, Ga., Box 1424 • Phone Sherwood 5-0466

Memphis, Tenn.: Box 2432, DeSoto Station • Phone: BRoadway 2-2806

Electrical Protection is MODERNIZED with BUSS Fuses in the

TAMPA CITY HOSPITAL
Tampa, Florida





PART OF MAIN SWITCH BOARD
Protected by BUSS Hi-Cap and FUSETRON fuses.
Installation includes 6—2500 amp., 3—2000 amp., 12—1200 amp., 9 — 800 amp. BUSS Hi-Cap fuses . . . . . and 3—600 amp., 9—400 amp., 27—200 amp. FUSETRON fuses

In this beautiful hospital, tremendous in size, it was found necessary to increase the capacity of the electrical system to meet today's requirements. Modernization of the electrical system resulted in estimated available fault currents of 150,000 amperes.

With faults of this magnitude possible, it became essential that a superior type of protective device be used.

So in the main switch board are BUSS Hi-Cap fuses and FUSETRON dual-element fuses, both applied to give the interrupting capacity and dependability needed on the circuits they protect.

ANOTHER BUSS HI-CAP AND FUSETRON FUSE INSTALLATION

ARCHITECTS AND ENGINEERS: *Norman F. Six and Elliot C. Fletcher, Tampa and Schmidt, Garden and Erikson, Chicago*

CONTRACTOR: *Miller Electric Co., Jacksonville, Fla.*

WHY HIGH INTERRUPTING CAPACITY IS NEEDED

Fault currents of 75,000 or 150,000 amperes were unheard of a few years ago, — but today they are quite possible. With the generating capacity of utilities increasing yearly, most likely the magnitude of fault currents will be higher in future years.

BUSS Hi-Cap and FUSETRON dual-element fuses have an interrupting capacity designed for today's conditions and to anticipate system growth.

The interrupting rating of BUSS Hi-Cap fuses is 200,000 amperes rms symmetrical — and for FUSETRON fuses it is 100,000 rms symmetrical.

WHY DEPENDABILITY IS NEEDED

With higher fault currents available, the dependability of the protective device becomes of increasing importance.

The protective device should be just as accurate in 10, 15, or 20 years, as it is on the day installed.

A fuse is the only type of protective device to offer this advantage. A fuse must remain safe and accurate, as its operation depends on a simple thermal law. A fuse has no triggers, latches, pivots or contacts to stick or get out of order. Dust, fumes, corrosion or age cannot increase a fuse's capacity or lengthen its blowing time.

for more information

On FUSETRON dual-element fuses - (loads of 0 to 600 amps.) - *write for bulletin FIS*

On BUSS Hi-Cap fuses - (loads above 600 amps.) - *write for Bulletin HCS*

BUSSMANN MFG. DIVISION, McGraw-Edison Co. **ST. LOUIS 7, MO.**

NEWS of the South-Southwest

Du Pont's Memphis Plant Expands

Getting underway for **E. I. du Pont de Nemours & Co., Inc.** is a multi-million dollar unit at its Memphis, Tenn., plant which will produce acrylonitrile, an important chemical raw material used in the manufacture of "Orlon" acrylic fiber. The new unit is scheduled for completion in late 1960 and will create about 65 new jobs at the Memphis plant, bringing total employment to more than 500.

Acrylonitrile will be produced by an improved process using hydrogen cyanide and acetylene, developed as a result of a research program by the company's Electrochemicals Department. Existing facilities for hydrogen cyanide, now made at the plant from ammonia and natural gas, will be expanded. Acetylene requirements will be purchased.

Aluminum Alkyls Mfg. Plant — Houston

Texas Alkyls Inc., the company formed by Hercules Powder Company and Stauffer Chemical Company to manufacture aluminum alkyls, will build its first production facilities on a site south of the Houston, Texas Ship Channel. Construction of the plant, which will cost about $1 million, is underway with completion scheduled for the fourth quarter of this year. Rated capacity of the Houston project will be in excess of a million pounds of aluminum alkyls annually.

Production emphasis initially will be on aluminum trialkyls. However, the plant will be designed to permit the manufacture of a range of aluminum alkyls. Operations will be based on a process developed and patented by the Max Planck Institute of Mulheim, Germany.

Bailey Meter — Atlanta

J. W. Cunningham of **Bailey Meter Company** has been named manager of the company's Atlanta district office. Cunningham succeeds M. J. McWhorter who has retired from the company after 38 years (34 of which have been as Atlanta manager).

Bailey Meter, whose headquarters are in Cleveland, Ohio, manufactures instruments and automatic controls for the power and process industries.

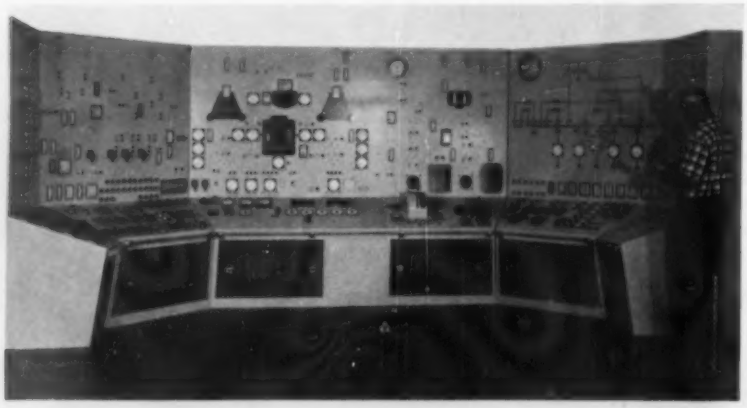
Cunningham joined the company in 1947, after his graduation from Clemson College. He has been on the Atlanta staff since 1948.

Control Board for NS Savannah

A factory engineer checks major portion of "Bailey Board" destined for the NS Savannah, United States Merchant Marine's first nuclear ship. Panel is seen here in final stages of assembly at **Bailey Meter Company's** Wickliffe, Ohio plant.

It was designed jointly by Bailey and **The Babcock & Wilcox Company**, prime contractor for the Savannah's nuclear propulsion system.

Panel mounted equipment includes nuclear instrumentation, reactor controls, and instruments and controls for the steam plant and auxiliaries.



Oakite — Texas

A transfer and two new appointments in its technical field service organization have been announced by **Oakite Products, Inc.**, manufacturers of specialized chemical compounds for industry.

Ben P. Fortin, a veteran of almost twenty years' service formerly assigned to Tyler, Texas, has joined the Oakite staff in Los Angeles, where he will serve the metal industries. His post in Tyler has been filled by **Henry L. Jones.**

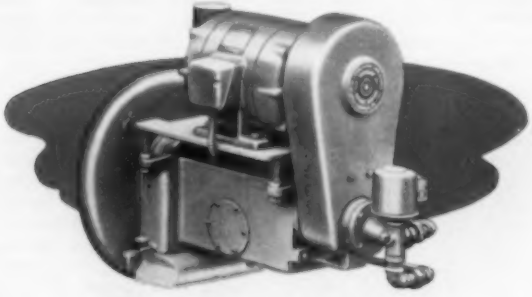
Wayland E. White has been appointed to the Corpus Christi territory. Both Mr. Jones and Mr. White came to Oakite with considerable experience in cleaning service.

(*Continued on Page* 22)

ALL PACKAGED BOILERS ARE NOT THE SAME

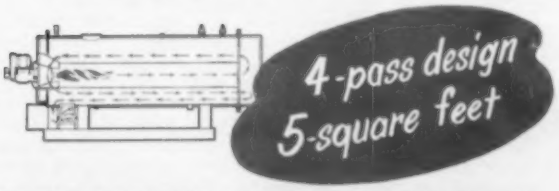
IS IT A TRUE PACKAGE?

Superior Packaged Boilers are complete . . . including burner, draft equipment, controls and all interconnecting piping and wiring. Completely factory assembled, and fire-tested at the factory before shipment.



IS IT ROTARY-BURNER EQUIPPED?

This is important for fully-automatic operation. The Superior Burner is capable of starting a cold boiler without compressed air, requires a minimum of supervision, and no lubrication whatsoever.



IS ITS HEATING SURFACE ADEQUATE?

Most boilers have adequate heating surface when new. Its effectiveness is lessened, however, as the boiler is used. To insure against this, look for a full five square ft. per boiler horsepower, and Superior's 4-pass, down-draft design.

CHECK THESE IMPORTANT FEATURES

before you buy...

There's a big difference in package boilers, that is not always obvious from external appearances. In the first place, many of the so-called packages are not packages at all, but combinations of boiler on the one hand and a burner-draft-control package on the other, shipped from separate manufacturers and assembled as a unit at the installation site.

Even in the true packages there are important differences in burner equipment, draft arrangements, and in the actual rating of the boiler itself.

Superior Packaged boilers are true packages, fully assembled and fire-tested at the factory before shipment. They are equipped with dependable Superior Rotary Burners, induced draft, integrated controls, and all interconnecting piping and wiring. They are conservatively rated, based on a full 5 sq. ft. of heating surface per boiler horsepower.

The location of the furnace within the boiler shell is carefully planned to provide protection against both low-water and mud-buildup failures.

Ask your engineer about Superior Packaged Boilers, his counsel is your best assurance of a boiler which will provide years of dependable operation at high efficiencies.

Type C Superior Packaged Boilers are manufactured in fourteen sizes, from 20 to 350 bhp., and with slight design modifications to 600 bhp. Sizes above 350 bhp. are designated as Type CF. All sizes are fully automatic firing oil, gas or both, and for pressures to 250 psi. Hot water units are also available. For complete information write giving capacity range desired, and ask for bulletin 15C.

Specialists in PACKAGED BOILERS... exclusively

SUPERIOR COMBUSTION INDUSTRIES, INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 36, N.Y.

SUPERIOR
PACKAGED BOILERS

Problem: SOUTHERN INDUSTRY NEEDED READILY AVAILABLE SOURCES OF MILL PRODUCTS & BUILDING ITEMS

Solution:

A FEW YEARS back the management and the name of the old Southern States Iron Roofing Company were changed. Under the guidance and sponsorship of Reynolds Metals Co., the parent company, new and reliable suppliers were contacted. Inventories in ten huge warehouses were increased, better organized. Adequate stocks of brass, copper, stainless and carbon steel, and Reynolds Aluminum mill products were put in each warehouse. In all, over half a million square feet of industrial products were put in inventory.

NEW EQUIPMENT was bought to handle the flow of industrial products in and out of the warehouses. Modern materials handling equipment unloads and loads from trucks and trains, moves materials to slitters, metal saws, shears, decoilers and other metal working equipment. Overhead cranes rapidly handle bundles of sheets, industrial building products and other items carefully stocked in our ten acres of warehouse floor space.

140 REPRESENTATIVES working out of ten major warehouses were trained to cover the entire Southeast to service the requirements of industrial metal users. These competent product specialists form an unmatched chain that extends from Richmond to Birmingham, from Memphis to Miami, to work on the specific details, quotations, and delivery schedules you need. Behind these men, product managers and general office personnel coordinate the inventories and order handling from branch to branch.

ON-TIME DELIVERIES were planned and executed by maintaining a fleet of company trucks to make deliveries to customers. A system of immediate order handling to expedite office-to-warehouse orders was installed.

Through the establishment of adequate industrial metals stocks from reliable suppliers, the addition of materials handling fabrication equipment, the employment of competent service representatives and the use of company trucks, Reynolds Aluminum Supply Company solves customers' metals problems. Call in your RASCO man. He may well solve your problems of today and contribute to your profit picture of tomorrow. *Write today for the new Fall copy of the 1959 Guide to Better Buying.*

REYNOLDS ALUMINUM SUPPLY CO.

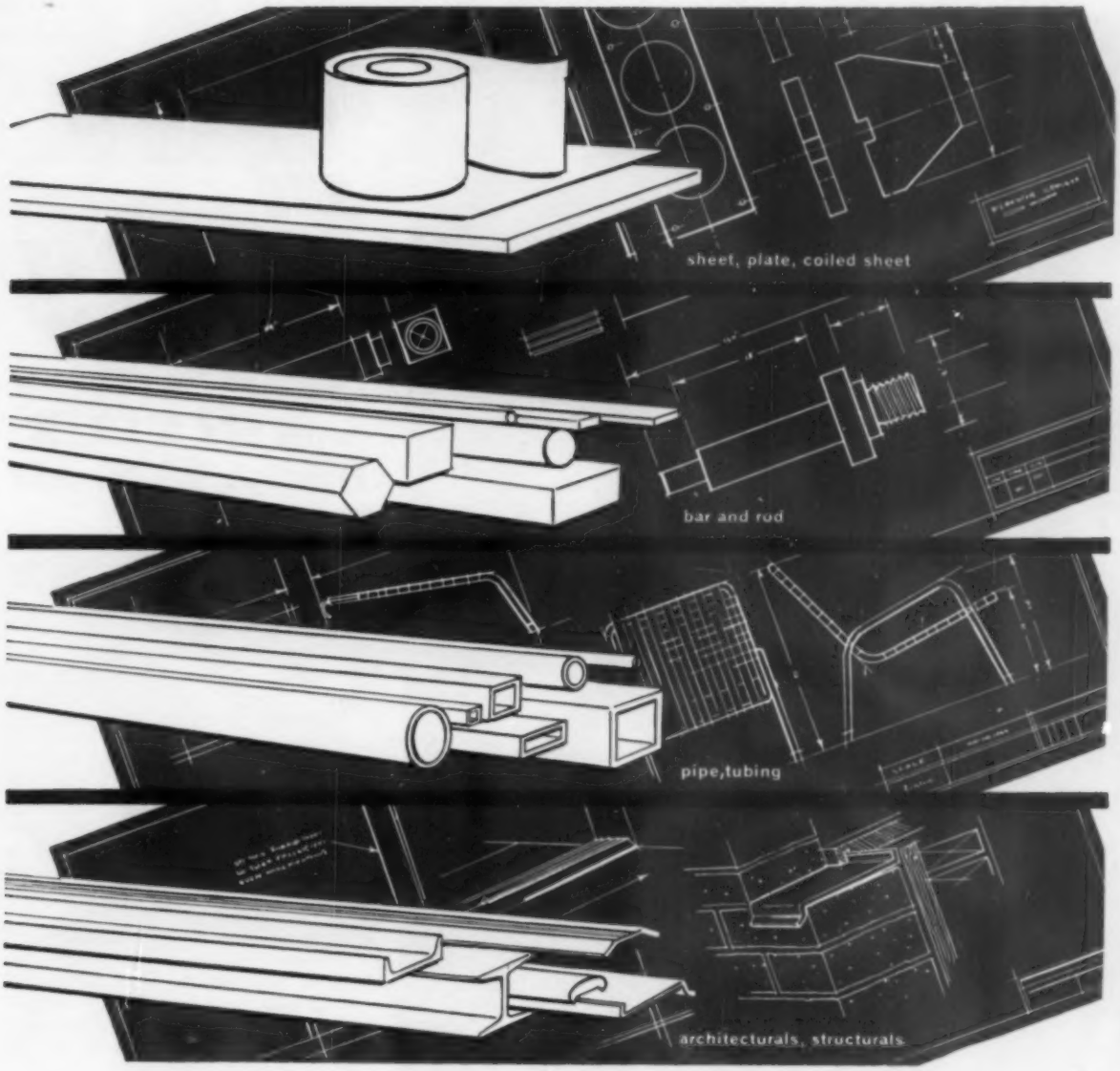
REYNOLDS ALUMINUM SUPPLY CO.

Established 1914

GENERAL OFFICES: ATLANTA, GEORGIA

ATLANTA, GA., 1530 Ellsworth Drive, N.E., SYcamore 4-9511
BIRMINGHAM, ALA., 2828 Fifth Avenue, N., FAirfax 2-5461
JACKSONVILLE, FLA., 1612 E. Eighth Street, ELgin 6-7636
MEMPHIS, TENN., 703 North Royal Avenue, JAckson 5-4717
LOUISVILLE, KY., Fern Valley Road & Crittenden Drive, EMerson 6-0314
MIAMI, FLA., 3690 N.W. 52nd Street, NEwton 5-0647
RALEIGH, N. C., 1431 Courtland Drive, TEmple 4-6221
RICHMOND, VA., 1910 Petersburg Pike, BElmont 2-6748
SAVANNAH, GA., 309 Stiles Ave., ADams 6-2461
NASHVILLE, TENN., Harrison Street at 7th Avenue, ALpine 5-1152

REYNOLDS ALUMINUM SUPPLY COMPANY



The Aluminum You Need is in Inventory

The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

REYNOLDS METALS COMPANY
Richmond 18, Virginia

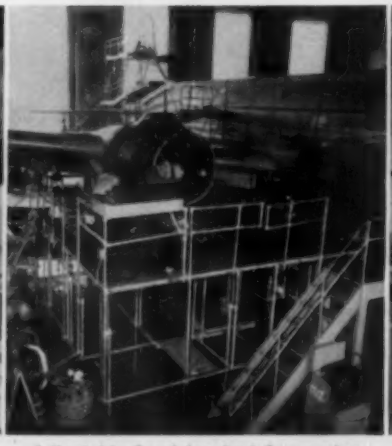
Whether you punch, stamp, form, draw or machine aluminum, the exact alloy, temper and size you need is in your Reynolds Distributor's stock. You save inventory *investment*, inventory *space*—and you're assured of *prompt* delivery of the finest quality aluminum available. The distributor representative who calls on you knows aluminum, its versatility and its applications. He's Reynolds trained. Make use of his technical knowledge to save production steps. And, at your next meeting, ask him about the basic fabrication services he can offer. He represents aluminum stock, aluminum service and aluminum economy. To get the most from the aluminum you need, rely on Reynolds Distributor inventory. Call him today.

10 REYNOLDS ALUMINUM SUPPLY COMPANY WAREHOUSES

With **NU-RAIL** and **SPEED-RAIL** Slip-on Fittings all it takes is a mixture of imagination, ingenuity and inventiveness and the result is:

EFFICIENCY SAFETY CONVENIENCE

Storage Racks for Palletized Loads Serviced by Fork Trucks



Adjustable Servicing And Conversion Platform For Aircraft

Passenger Traffic Control Railings In Airline Terminal

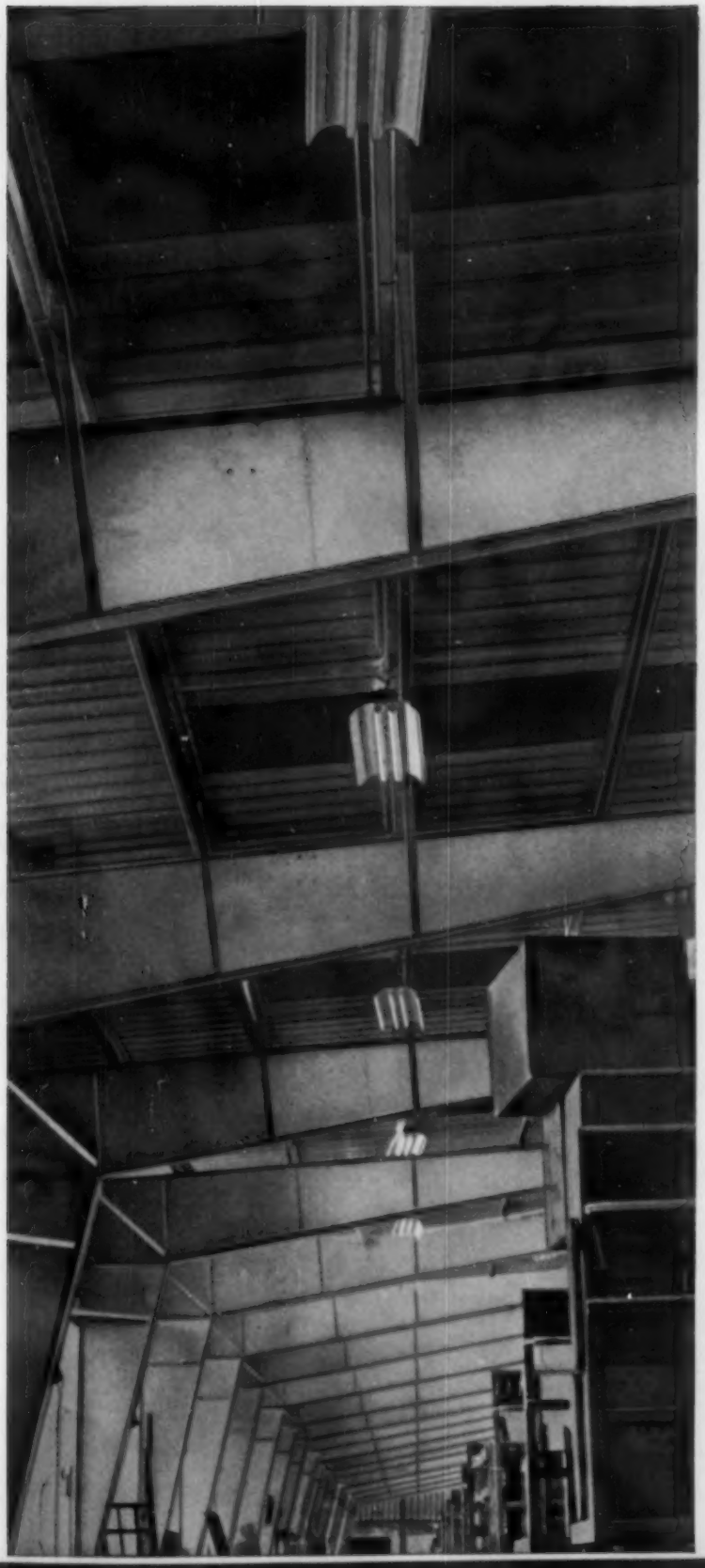
Fittings are made to slip on I.P.S. standard pipe or tube in sizes up to 2″. No threading or welding is required; fittings are held in place by knurled-point, hardened set-screws.

The special aluminum alloy will not corrode so Nu-Rail and Speed-Rail Structural Fittings can be used outdoors or indoors, without regard to weather or atmospheric conditions. Fittings and pipe are 100% salvageable,—a money-saving advantage when frequent changes of storage racks, or safety railings, are required.

There are many other money saving advantages when pipe structures are built with NU-RAIL or SPEED-RAIL Slip-On Fittings. Write or phone for Catalog and Bulletin RA.

THE HOLLAENDER MANUFACTURING CO., • 3841 SPRING GROVE AVE., • CINCINNATI 23, OHIO

HAS THE FINEST INDUSTRIAL MATERIALS FROM



Cut glazing and skylighting costs

with STYLUX Daylighting Panels

New Stylux not only eliminates window breakage and cuts artificial lighting bills—it also lowers the overall cost of changing over to daylighting panels.

First of all, you get a proved longer life without replacement due to a new weather-tested resin bonded to an improved, superior quality fiberglass mat. This produces a tougher panel of unmatched clearness providing up to 90% light transmission for industrial use.

Secondly, new Stylux comes in a larger, money-saving 51-inch size that is a 4-foot coverage section. Depending upon the job, this larger size means considerable savings in time, labor and fastening costs. You get this plus at no increase in price!

Stylux comes in all standard panel and window pane sizes, is easily installed. All types of corrugations and flat panels. Shatterproof, non-corrosive, flame-retardent grades of Stylux bear both Underwriters' Laboratories and Factory Mutual labels.

Enjoy the savings and protection of skylighting panels; insist upon the better quality, the greater economy of Stylux. For full-color literature and specification data, for the name of your nearest Stylux Dealer, write us at the address below.

Stylux by BUTLER

PLASTICS DEPARTMENT, BUILDINGS DIVISION

BUTLER MANUFACTURING COMPANY

Kansas City 26, Missouri

M THE NATIONS MOST RELIABLE SUPPLIERS

New "washing machine" makes CLEAN stainless steel

More often than not, titanium-bearing stainless can hike your fabrication costs . . . due to subsurface stringers or banding that cause excessive scrapping of parts. At Eastern, however, these harmful inclusions come out in the "wash."

Eastern's exclusive slag wash melting process produces the *cleanest* titanium-bearing stainless you can buy . . . exceptionally free from non-metallic contaminants . . . and at *no extra cost*. Eastern's new high-capacity slag furnace will meet industry's growing demand for such titanium-bearing steels as 321SW, 19-9DL, A-286, 19-9DX. Which do *you* need—and how fast?

EASTERN STAINLESS STEEL

Baltimore 3, Maryland, U. S. A.

SERVE THE SOUTHEAST WITH SPEED, ECONOMY & EFFICIENCY

Checking, inspecting and adjusting mechanism used in plant's electrical system.

Westinghouse furnishes a written report of the condition of all electrical equipment and recommendations on parts and repairs.

"now operating"... with a WESTINGHOUSE MAINTENANCE CONTRACT

Florida Steel Corporation in Tampa, Florida, started operations in September, 1958.

Mr. R. R. Black, Sr., General Manager, contracted with Westinghouse for a complete maintenance inspection and engineering service on a quarterly basis. He reports, "Our experience to date has proved to us that our Westinghouse Maintenance Contract has already paid for itself many times. Down time is at a minimum, and when troubles develop, we are assured of fast, capable service."

You can now have a Westinghouse maintenance engineer check and test all of your electrical equipment under contract—weekly, monthly or yearly, depending on your needs. These scheduled inspection recommendations and adjustments can prevent equipment failure, reduce outages and down time to a minimum.

For complete information, call or write Westinghouse Electric Corporation, 1299 Northside Drive, N. W., P. O. Box 4808, Atlanta 2, Georgia. J-95206

YOU CAN BE SURE...IF IT'S

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV FRIDAYS

Contract service offered in Westinghouse Southeastern Region Only.

For more information, use Reply Card—Page 105

Boiler Drum for Texas Plant

Power on Rails — This 90 foot long, 200 ton steam drum was shipped recently "special clearance" from Mountaintop, Pa. to Smithers Lake, Texas.

The drum was "swivel mounted" on two heavy duty Union Pacific cars with idler cars at either end to insure proper load distribution over bridges and structures. Each end of the six foot diameter vessel was seated in a large wooden cradle designed to pivot about its center. This pivoting action permits the load to gain clearance when negotiating curves.

The steam drum itself will soon supply 1,950,000 pounds of steam per hour to a 285,000 kw electric-turbine at the Smithers Lake Station of the **Houston Lighting and Power Company.** The 5¾ inch thick walls of the drum are designed to contain saturated steam at a pressure of 2,525 pounds per square inch. It is the longest steam drum built by Foster Wheeler and it will be installed in the largest single furnace steam generator designed and erected by this manufacturer.

R. L. Granger *B. S. Myers* *E. J. Robeson* *W. E. Cavell*

Chemstrand Personnel for Greenwood, S. C.

Key personnel assignments for the **Chemstrand Corporation's** new nylon plant to be built in Greenwood, S. C., have been made by Plant Manager Robert L. Granger.

Named were **Boyce S. Myers,** personnel superintendent; **Edward J. Robeson, III,** plant engineer; and **Walter E. Cavell,** manufacturing superintendent. All are now employed at Chemstrand's nylon plant at Pensacola, Florida.

Mr. Myers, now assistant personnel superintendent at Pensacola, joined Chemstrand in March, 1952, following service with Georgia Kaolin Co., Dry Branch, Ga., as industrial relations manager, and employment supervisor for the Veterans Administration at Thomasville.

Mr. Robeson, originally from Newport News, Va., joined Chemstrand in 1953 as polymer, spinning, and textile maintenance supervisor. Previously, he was a maintenance supervisor for E. I. du Pont de Nemours Co., Inc. He operated his own business at Augusta, Ga. after serving as assistant superintendent for the Norfolk Drydock and Shipbuilding Co.

Mr. Cavell, currently area supervisor in the yarn manufacturing department at Pensacola, joined the organization in 1952 and was promoted to his present position in 1955. He was Works Manager for Harding Yarns, a division of Harding Carpets Ltd., Guelph, Ontario, prior to joining Chemstrand. Previously he was plant engineer for Harding Carpets at Brantford, Ontario.

Southern Electric Appointments in Tenn.

Changes in the organization of **Southern Electrical Company,** Chattanooga, Tenn., an operation of the Metals Division of Olin Mathieson Chemical Corporation, have been announced by Milton L. Herzog, vice president and general manager of operations, Metals Division.

H. D. Seaton, Sr., formerly general manager of Southern Electrical Company, has been appointed consultant to N. H. Collisson, vice president and general manager, Metals Division. In his new capacity, he will assist and advise Metals Division management on Southern Electrical manufacturing and sales activities.

Mr. Herzog also announced the appointment of **Charlton W. Smith** as plant manager with responsibility for the operation of the Chattanooga plant where Southern Electrical products are manufactured. He will report to Harry E. Gude, vice president for manufacturing, Metals Division.

H. H. Bullen was named director of electrical conductor sales, reporting to Derek Richardson, vice president of aluminum sales, Metals Division.

Tull — Atlanta

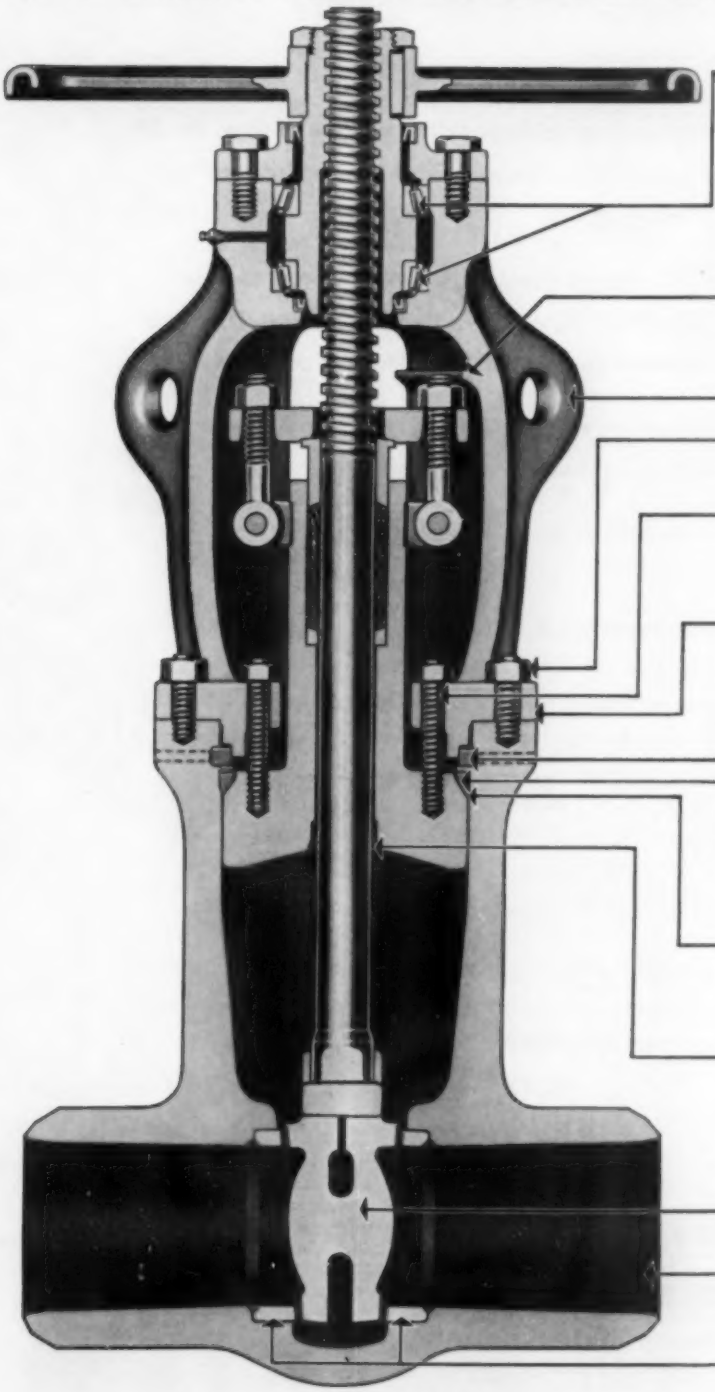
Carroll L. Wagner was recently appointed General Sales Manager of the **J. M. Tull Metal & Supply Co., Inc.**

Mr. Wagner has been engaged in sales work for the J. M. Tull Company for the past five years. He has had a total of over twenty years' experience in the field of metal sales and distribution. He now assumes the position of administrator of the Company sales program, working from the Company's home office in Atlanta, Georgia.

(*Continued on Page* 26)

POWELL PRESSURE SEAL VALVES

GATE, GLOBE, ANGLE and CHECK PATTERNS
Pressure Classes . . . 600, 900, 1500, 2500 Pounds and Higher . . . ALL COMMERCIAL SIZES



Tapered roller bearings are most satisfactory for high thrust loads.

Lugs on the inner side of yokearms provide a convenient shelf for suspending gland flange when renewing packing.

Lifting lugs facilitate handling the valve during erection and maintenance. Also provide means for supporting weight of the valve.

Body studs hold the yokearm to the body. These eliminate the need of a heavy clamp, and maintain perfect alignment and rigidity of yoke to the body.

Bonnet studs are used to establish the initial seal of the gasket between the body and the bonnet.

Streamline contour of body simplifies application and reduces cost of insulation, and effects marked savings in space and weight.

Segmental thrust ring absorbs all the thrust applied by internal pressure. This design enables valve to be easily assembled and disassembled.

The gasket may be removed without damage to seating surface of body.

The gasket seating surface in the body may be easily lapped, if required—an outstanding feature in Powell Pressure Seal Valve design.

Stellite faced back seat and stem guide insure tight sealing, accurate guiding of stem and protects packing when valve is back seated.

Flexible "H"-type wedge, which is stellited, prevents sticking because of temperature changes and pipe line stresses, thus reducing opening torque.

Streamlined passage makes possible maximum flow with minimum turbulence.

Seat Rings are stellite faced, accurately machined and welded in place.

(Sectional) PRESSURE SEAL GATE VALVE

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

"Here at AMERICAN CAN we're package

"Ours is a specialist's approach to packaging. It's been our business for 58 years, and we've built a reputation for knowing what it takes to design and produce a package that moves goods.

"It's the same with our OTIS Freight Elevators. We have 154 of them in 75 AMERICAN CAN COMPANY plants across the United States. They're a vital part of our production facilities that turn out millions of packages a day.

"As specialists, we knew from the start that the OTIS specialist's approach to Elevator Maintenance was the right way to assure continuous production."

What is the OTIS *specialist's approach* to elevator maintenance?
It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

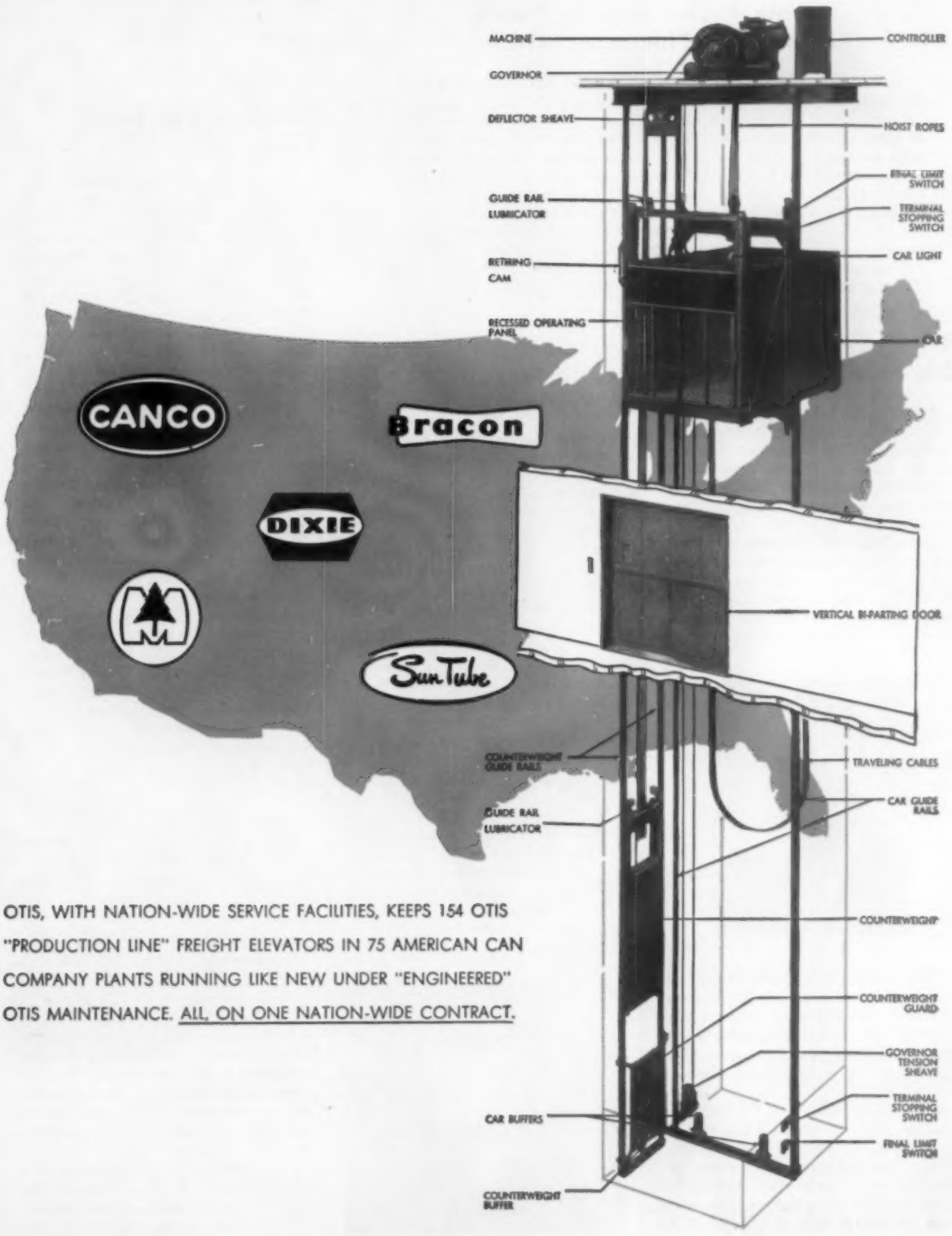
METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

freight elevator maintenance

ASSURES CONTINUOUS PRODUCTION

OTIS ELEVATOR COMPANY • 260 ELEVENTH AVENUE • NEW YORK 1, N.Y.
OFFICES IN 297 CITIES ACROSS THE UNITED STATES AND CANADA

men . . . not elevator maintenance men"



OTIS, WITH NATION-WIDE SERVICE FACILITIES, KEEPS 154 OTIS "PRODUCTION LINE" FREIGHT ELEVATORS IN 75 AMERICAN CAN COMPANY PLANTS RUNNING LIKE NEW UNDER "ENGINEERED" OTIS MAINTENANCE. ALL, ON ONE NATION-WIDE CONTRACT.

Tommy Tucker Plastics Builds New Dallas Plant and Offices

A 20,000 sq ft plant and office building for **Tommy Tucker Plastics** in Dallas, Tex. is nearing completion at 3411 East Kiest Blvd.

Costing $125,000, the new plant will be located on a 2½ acre plot of ground with ample space for future expansion. A paved parking area will surround the loading docks at the side of the building.

The firm will add a line of injection-molded boxes to expand their plastic packaging division. An automatic sheeting machine for converting rolls of plastic material into sheets is being installed. Custom fabrication of polyethylene film for industries needing special plastic covers for motors and other manufactured products will be offered.

General Contractors for the new building are C. P. Freeman and A. P. Wiley, Jr. of Dallas, with A. P. Wiley, Jr. as architect.

Olin Aluminum — SW

William P. Liljestrom has been appointed southwestern regional sales manager for **Olin Aluminum**, according to John M. Welch, director of aluminum field sales, Metals Division, Olin Mathieson Chemical Corporation.

Mr. Liljestrom, formerly assistant manager of sheet and plate product sales, New York, succeeds Forrest F. Tiffany who is now director of sales development for Olin Aluminum.

Mr. Liljestrom will be located at the new southwestern regional sales office at 100 Exchange Park North, Dallas, Tex. Sales headquarters for the southwestern region were formerly located in Cincinnati, Ohio.

Associated with Olin Mathieson since April 1957, Mr. Liljestrom earlier held the post of Dallas district sales manager for Olin Aluminum. Previously, he had been associated with Reynolds Metals Company as market manager, chemical and petroleum sales, Louisville, Ky.

Tex-Vit Expands at Weatherford, Texas

Tex-Vit Supply Company, Mineral Wells, Texas, has started production of a new line of sewage lift stations at its plant in Weatherford, Texas. The firm recently moved its manufacturing division to the new location in order to gain additional space for its finished product assembly operations. The plant is approximately 30 miles west of Fort Worth.

The company's expanded line will include pneumatic sewage ejectors, packaged wet pit pump stations, packaged dry pit pump stations, and packaged ejector stations.

The new plant will handle all assembly and finishing operations, as well as final inspection, testing, and shipping, according to J. F. Bailey, the company's president. Production at the Weatherford plant will be on a somewhat limited scale during the first few months, but an increasing backlog of orders is expected to speed up the new operation, he said.

The accompanying photograph shows an interior view of Tex-Vit Underground Dry Pit Sewage Pumping Station manufactured at Weatherford. Showing the Duplex Flexible-Coupled Pump Assembly, Centralized Electrical Control Box, and Dehumidifier Unit. The packaged assembly is fully enclosed in a cylindrical steel tank which is welded to the base plate.

Petroleum Elec. Power Elects Officers

The **Petroleum Electric Power Association** elected its new officers for 1959-60 term at its 31st annual meeting in Galveston, Tex. The incoming President is **D. S. Coffman** of Texas Power & Light Company, Dallas; Vice President is **W. M. Larkin** of Gulf States Utilities Company, Lake Charles, Louisiana; Secretary-treasurer is **B. F. Thompson** of Public Service Company of Oklahoma, Tulsa, Oklahoma.

The following is a list of the new directors for the Petroleum Electric Power Association for the coming year: **Langston Ashford**, Central Power & Light Company, Corpus Christi, Texas; **W. M. Larkin**, Gulf States Utilities Company, Lake Charles, Louisiana; **Paul Atwell**, Mississippi Power & Light Company, Jackson, Mississippi; **B. F. Thompson**, Public Service Company of Oklahoma, Tulsa, Oklahoma; **Jas. E. Moody**, Southwestern Electric Power Company, Shreveport, Louisiana; **D. S. Coffman**, Texas Power & Light Company, Dallas, Texas; **Harold S. Nay**, Kansas Gas & Electric Company, Wichita, Kansas; **John Odom**, Texas Electric Service Company, Midland, Texas; **Paul B. Ferris**, Empire District Electric Company, Joplin, Missouri; **Kirby Dawkins**, West Texas Utilities Company, McCamey, Texas; **Roger K. Owen**, Southwestern Public Service Company, Amarillo, Texas.

Nukem Products — SW

Geo. P. Reintjes Co., 2517-19 Jefferson St., Kansas City 8, Mo. has taken on the agency for selling acid cements and epoxy paints of **Nukem Products Corp.**, Buffalo, N. Y.

Reintjes will have the exclusive sales territories of Missouri, Kansas, Oklahoma, Arkansas and southern Illinois.

The Nukem line consists of acid brick cements and epoxy paints for use in steel mills, power houses, dairies, food processing plants, etc.

Compact and completely pre-assembled, Inland Empire Paper Company's Package Air Preheater is ready to be connected to a 100,000 lb/hr boiler. This particular Package Air Preheater (incidentally a repeat order), measures approximately 10'x10'x8', and its 7000 square feet of effective heating surface will recover about 360° F. from the stack gas. Package design cuts installation time and costs drastically.

Here's why
Inland Empire Paper Co.
chose a

PACKAGE AIR PREHEATER

BIG INSTALLATION SAVINGS — AND FUEL SAVINGS THAT CAN PAY FOR THE AIR PREHEATER WITHIN TWO YEARS.

Inland Empire Paper Company, Millwood, Wash., makes these big savings with their Package Air Preheater:

1. Low-cost installation. That single unit on the truck is a *complete* Package Air Preheater. Once in place, and the ducts and power line hooked up, it will be ready to go—installed without erection in a fraction of the time required for conventional units.

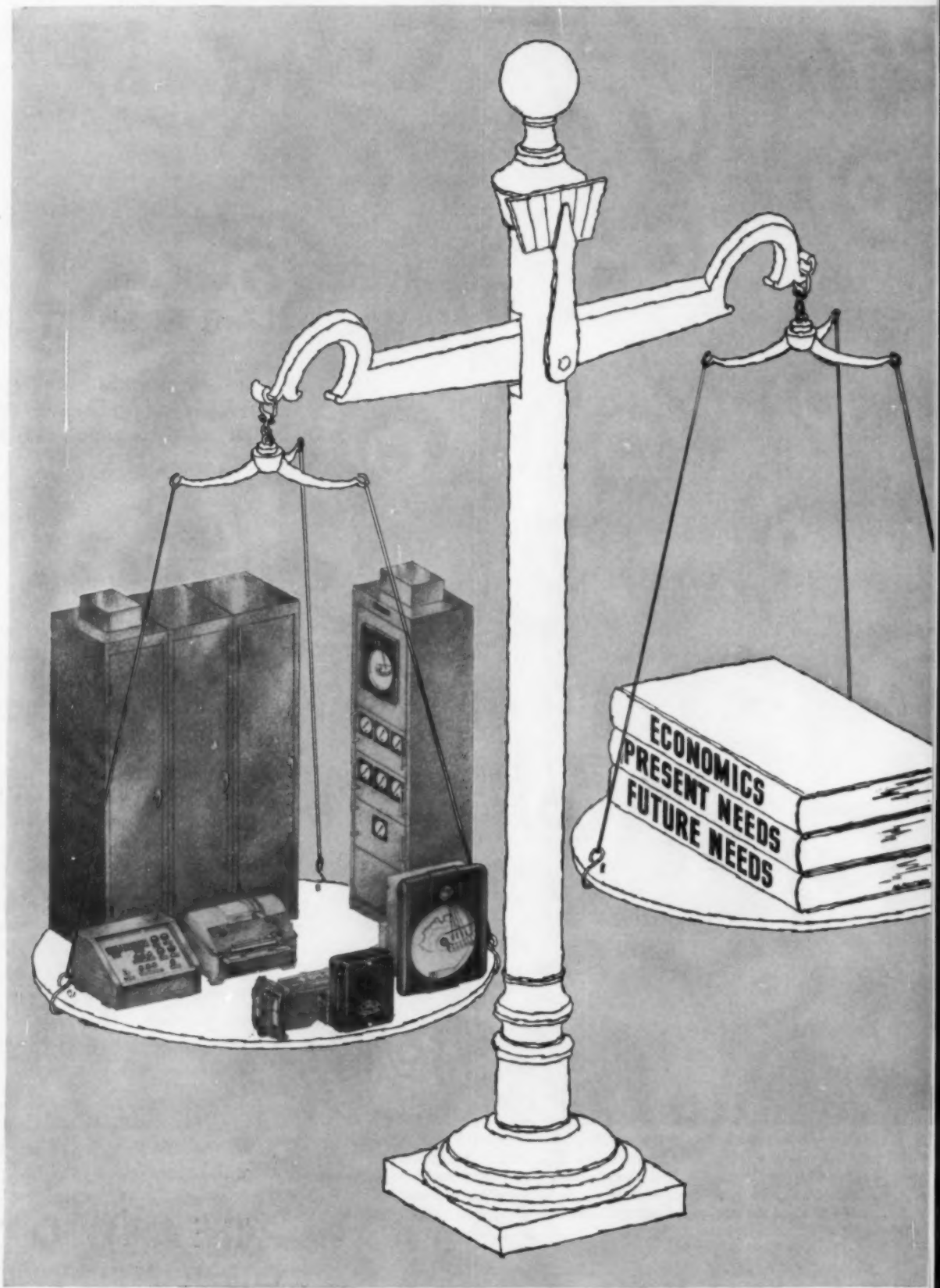
2. Short-term write-off. Records of Package Air Preheaters operating all over the country prove that Inland Empire's Package unit can pay for itself in two years, just on fuel savings alone!

You get this double advantage with the Package Air Preheater because it's completely shop-assembled. And its compact design brings all the advantages of continuous regenerative heat recovery to boilers as small as 25,000 lbs of steam per hr—or as large as 250,000 lbs per hr.

There are other important advantages, too. Get the whole story by writing today for your free 14-page booklet with all the facts and figures.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.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FUTURE NEEDS

BAILEY

BALANCES ALL THESE FACTORS TO HELP YOU REACH OPTIMUM PERFORMANCE

Bailey takes a sensible systems approach by analyzing the immediate and future needs as well as the control economics of your complete process.

Backed by 40 years' experience in the field of measurement and control, Bailey engineers can insure that your system will have the proper balance both as to economics and needs . . . that there will not be the unnecessary expense of over-instrumentation or control . . . nor the duplication of equipment functions.

To effect this approach, Bailey offers a complete line of process and power system components:

Equipment—Primary sensing devices, indicators, recorders, loggers, control units, panels, data-handling equipment and computers for performance analysis, and supervisory controls.

State-of-the-Art—Conventional and sophisticated designs ranging from mechanical, pneumatic and electric thru electronic and solid-state.

Because all of these components are *standardized and compatible*, you have building block flexibility. You can add to your system as the need arises for more control or analysis.

Our complete line gives you one-source buying . . . one responsibility . . . qualified systems engineering . . . fast service . . . experienced field assistance on one instrument or on a complete system. Call our nearest office or write for information today.

G150-2

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TIMELY COMMENTS

Things Are Getting Better — But?

NEW MATERIALS, new methods, better equipment — production has increased enormously in the past ten years. Practically every plant manager can point with pride to his accomplishments. Nearly everyone can claim improvements. And nearly everyone has improved — at least in certain categories.

But in too many instances, improvement in one section is offset by slippage in another. In other words, the grand total of improvement may not be as great as we are inclined to think when we attend technical meetings — or when we read about improvements such as those presented in this ANNUAL BETTER PRODUCTION issue.

Let's take a mathematician's approach to prove that not all is on the up and up. An average of 7% improvement per year might not sound too big to hope for. But if we did that good all over the plant every year for ten years, performance would double. Most of us will agree that few operations become twice as good every ten years — so for most of us something is spilling off somewhere.

Now we are up to the point of this discussion: Look for improvements, study improvements and make improvements. But while you are at it — make sure you are not robbing Peter to pay Paul.

Here are some points to watch:

(1) Don't spend a lot of money to improve one link in the production chain if the rest of the plant can't stand the pace.

(2) Don't fail to include the cost of minor changes in other departments that add to the total cost of a "one-department" project.

(3) Don't base your studies on past performance and past needs. Try to predict coming conditions. You won't save much money by improving old procedures that will be thrown out in a year or two.

(4) Don't fail to include inflation as an element in studying long range plans.

(5) Revise your depreciation rates in view of the fact that a replacement ten years from now may cost twice as much.

The above are only a few of the hurdles in the way of sustaining an all-over Better Production Trend. There are many more — so many, in fact, that too many of us give up and let things stay as they are.

This issue enumerates and describes a great many proven ways of accomplishing improvements. Study them and apply them. But always evaluate them in terms of your own plant conditions. There is always a better way.

U. S. Must Reimburse Utilities Dixon-Yates Contract Was Valid

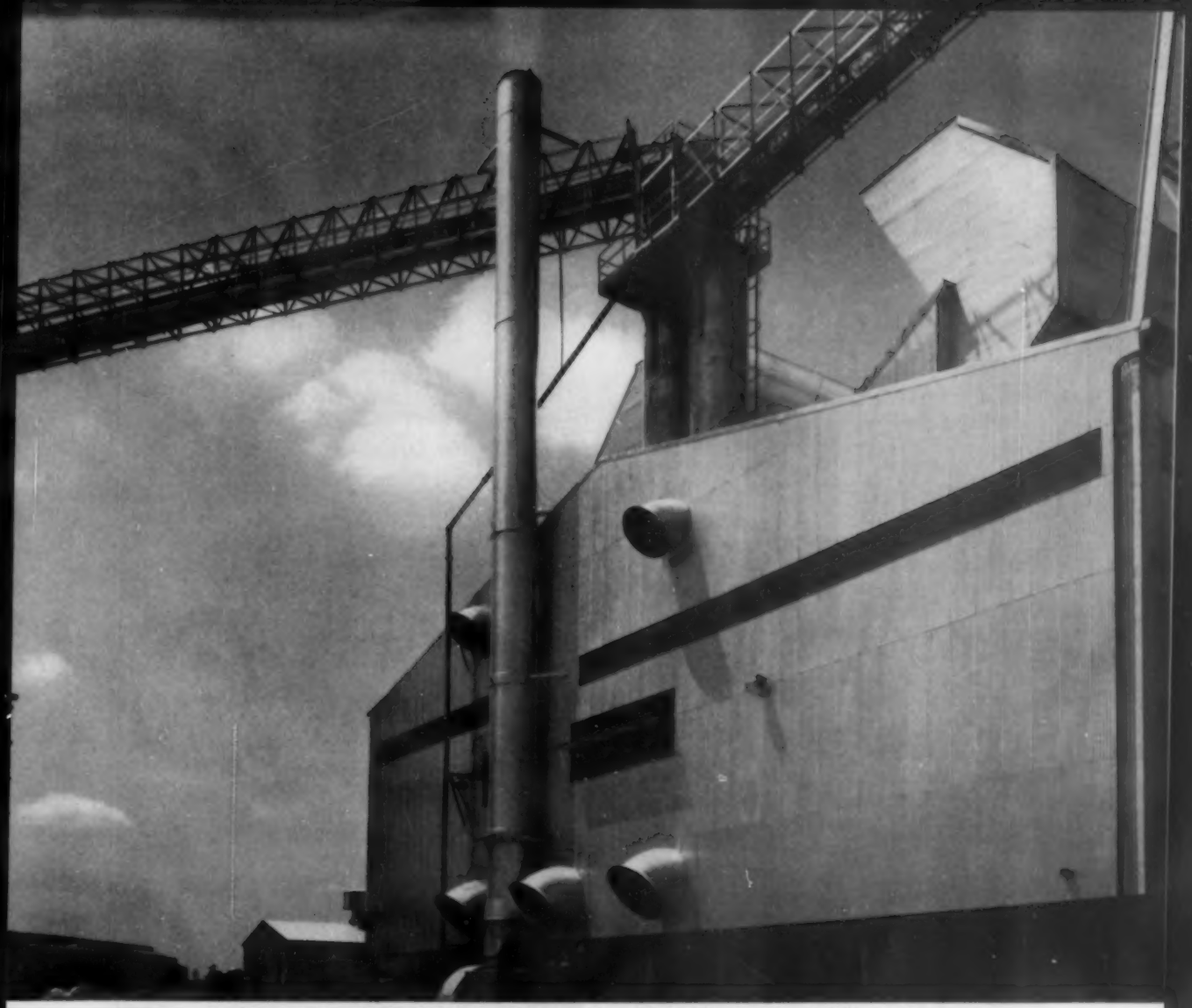
THE U. S. COURT of Claims handed down a decision on July 15, holding that the U. S. Government must reimburse Middle South Utilities, Inc., and The Southern Company in the amount of $1,867,545 for expenses incurred before the Dixon-Yates contract was cancelled by the government in 1955.

The court ruled that the power contract was valid and that the United States had wrongfully and without justification voided its obligation when it cancelled the contract and refused to pay termination costs. The majority view of the Court of Claims held that the government was at fault in failing to go through with the building of a power plant at West Memphis, Ark., to supplement the TVA power supply.

From its inception, the contract was fought bitterly by public power advocates. The real issue was never the contract itself, but the public power issue.

The majority of the court further held that there was no conflict of interest involving Adolphe H. Wenzell, who acted as the government adviser when the contract was being drawn up. While acting for the government, Mr. Wenzell was a vice president of the First Boston Corporation, which was interested in the financing of the plant.

In a statement, following the decision of the court, Harllee Branch, Jr., president of The Southern Company, said, "Since the decision sustains the so-called Dixon-Yates contract with the Atomic Energy Commission, it constitutes a satisfying vindication of the integrity of the actions of Middle South Utilities, Inc., and The Southern Company in responding to a request of the U. S. Government."



Here is one of two identical stack installations at Owens-Illinois Glass Company's Atlanta, Ga. plant. Stacks are 75 ft. high, 3 ft. in diameter, fabricated from ¼-inch to ⅜-inch thick 4-D Wrought Iron Plate.

4-D Wrought Iron Plate lengthens stack life... reduces maintenance costs at new Owens-Illinois plant

In installations built to last, it is questionable economy to start with a low first-cost metal with a short life potential.

That's why material selection for stacks and other installations is so positive at Owens-Illinois Glass Company's new Atlanta plant. They use 4-D Wrought Iron.

In an environment of high-temperature flue gases—where accelerated oxidation is a consideration—4-D Wrought Iron's durability and long service life reduce maintenance costs. 4-D Wrought Iron's glasslike iron silicate fibers—distributed throughout the pure base metal—provide outstanding corrosion resistance.

4-D Wrought Iron is also used in the plant's boiler breeching, downspouts, cooling water and return lines. The material's low cost per year of service makes solid sense in *any* preventive maintenance program.

So put this time-tested metal to work in your corrosive applications. And write our Engineering Service Department for new 4-D Wrought Iron literature and test results. A. M. Byers Company, Clark Building, Pittsburgh 22, Pennsylvania.

New Plant: Owens-Illinois Glass Company, Atlanta, Ga.
Stack Fabrication: J. J. Finnegan Company
Piping Installation: Standard Engineering Company

BYERS WROUGHT IRON

TUBULAR AND FLAT ROLLED PRODUCTS
ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS AND PVC PIPE

Corrosion costs you more than Wrought Iron

INDUSTRY SPEAKS

Plans to Harness Power of the H-Bomb

A SPACE AGE plan to harness the power of the H-Bomb for peaceful pursuits is moving toward accomplishment today thanks, in part, to alumina — the powdery white oxide from which metallic aluminum is produced.

Aluminum Company of America is supplying the material for use in a ceramic chamber, being built to contain a reaction which may achieve temperatures above 100,000,000 degrees Centrigrade—five times the temperature of the sun. The ceramic chamber will form the heart of a device known as the C Stellarator, or "star generator" . . . a term denoting its hoped for ability to confine solar type energy.

Existence of the Stellarator first was disclosed at the 1958 Geneva Conference as one of several instruments on which U. S., British, Soviet and other scientists are pinning their hopes of extracting usable power from thermonuclear reactions.

It is expected to function by keeping a controlled H-Bomb reaction suspended in a powerful magnetic field within a tube incorporating the alumina-ceramic chamber.

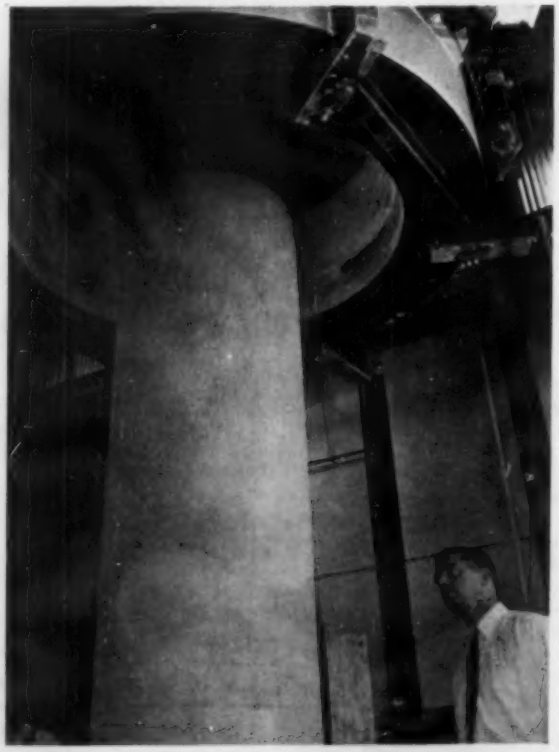
The alumina-bearing Stellarator liner will be in the form of a cylinder, 49 inches long and 20 inches in diameter. It is the largest ceramic ever produced from what engineers term a "high alumina" material — in this case, a patented formula containing 95 per cent aluminum oxide.

Ceramic experts first believed fabrication of the cylinder to be a technical impossibility, but Frenchtown Porcelain, Frenchtown, N. J., drew on its experience as a producer of intricate ceramics for the electronics industry. Intensive research, including a decision to have the cylinder machined in a gun barrel factory, ultimately solved the fabricating problems.

Work on the Stellarator principle has been underway at Princeton University since 1951. As part of Project Matterhorn, tests have been made with smaller, "B" model devices. The C Stellarator, four times larger, will mark another step toward achievement of an understanding of the physics of very hot gases.

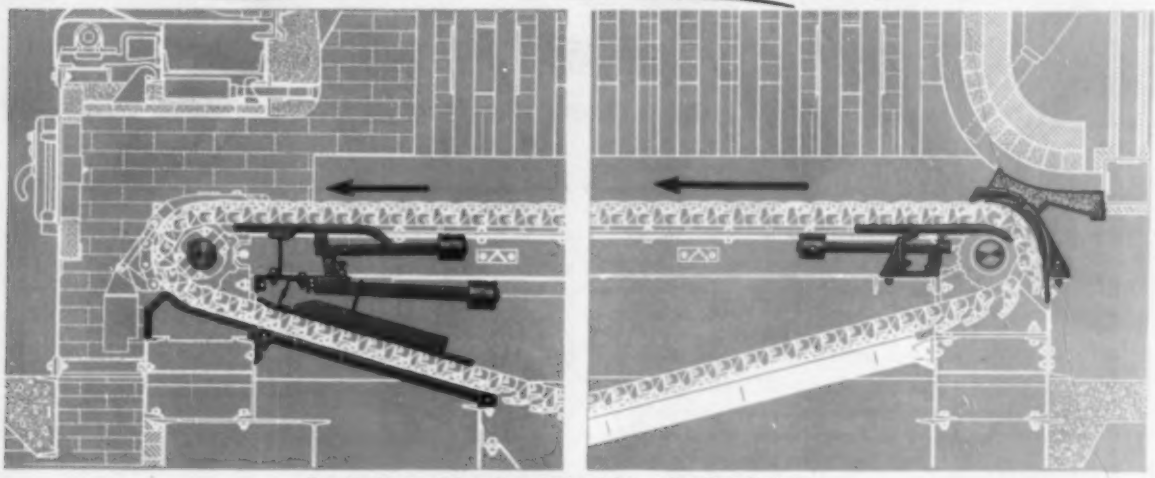
Fuel for the Stellarator will be heavy hydrogen. If the theory works, the world's oceans would provide an inexhaustible fuel source.

Science has not yet produced proof that a controlled thermonuclear reaction is possible. However, neither has any insurmountable obstacle been reported. If the effort proves successful, mankind will benefit from millions of kilowatt hours of energy at negligible fuel costs.



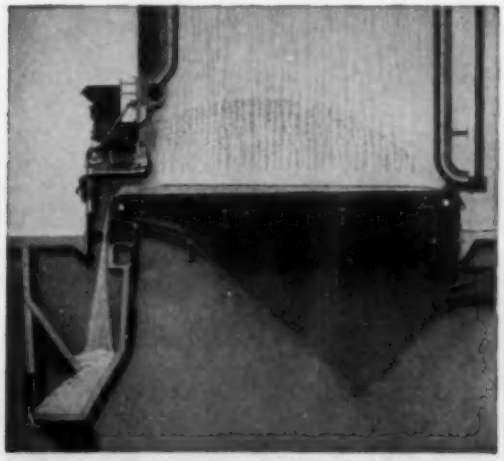
Firing of the largest high alumina ceramic parts ever produced is now taking place at Frenchtown Porcelain Company, Frenchtown, N. J. Tom Macey, Frenchtown president, watches as a giant kiln is lowered over the "green" ceramic. The part will be used as a reaction chamber in the C Stellarator, a device now being developed to harness H-Bomb power for peaceful pursuits.

DOWN WITH EXCESS AIR!



Floating Front and Rear Grate Seals—A Detroit RotoGrate Exclusive. They decrease excess air.

Automatic Air Seals Exclusive With Detroit RotoGrate Stokers Reduce Excess Air to 22% and Lower



Detroit RotoGrate Stoker — an advanced design spreader stoker with forward moving grates, for medium and large boilers. Burns all ranks of bituminous coals and lignites without special preparation . . . also many waste or refuse fuels, either alone or in combination with coal. Efficiency is high — maintenance low.

Many users reduce excess air to 22% or under, due to these free floating automatic front and rear seals with adjustable counterweights. They really seal, and stay sealed even after years of service. Air is directed to the active combustion zone. The result is increased combustion efficiency and economy.

The rear under-grate seal plate provides a quiet coking section which extends across the furnace . . . expedites the ignition of green fuel.

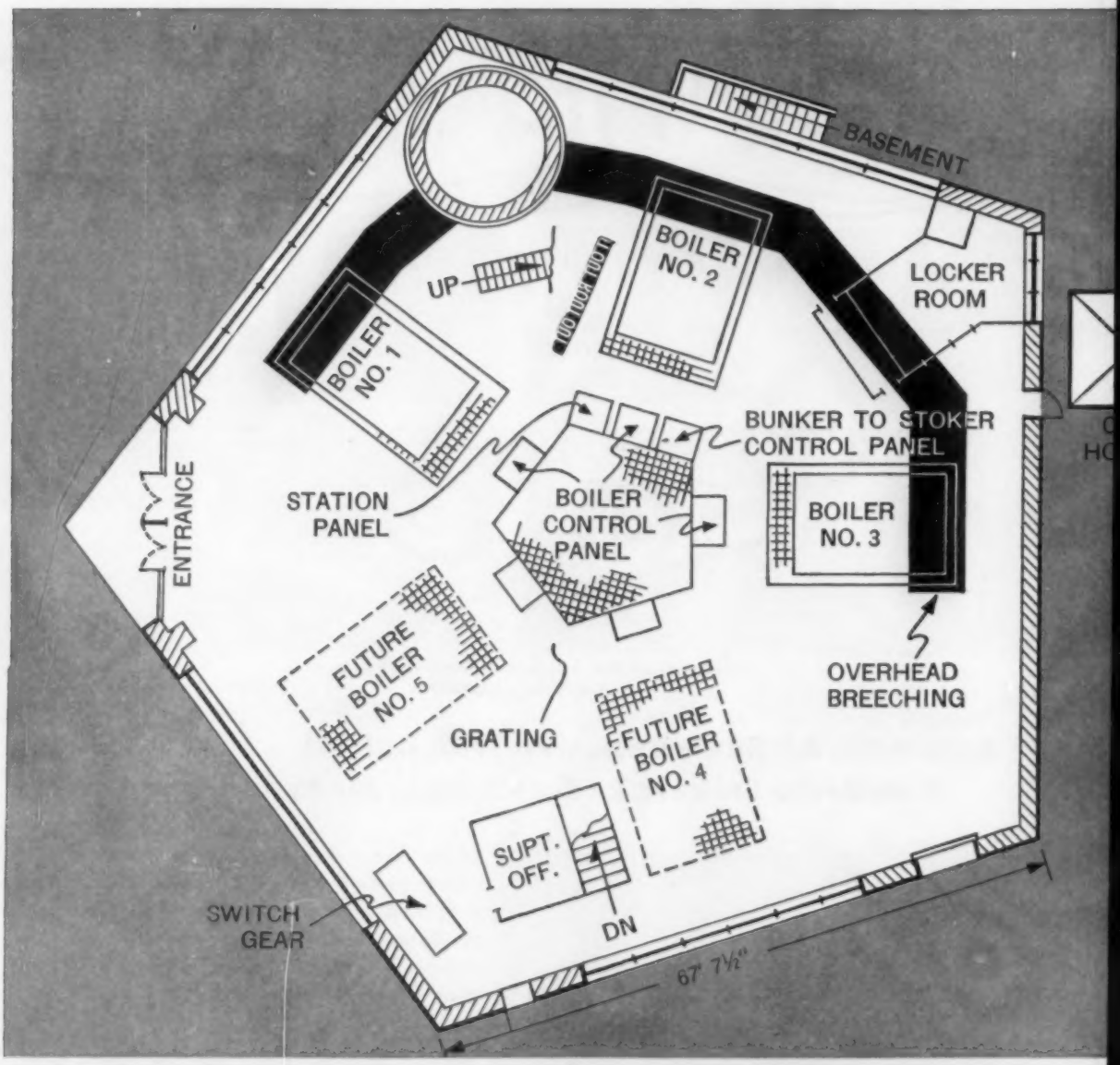
These and many other exclusive features of advanced design make Detroit Stokers your best buy. There is a type and size Detroit Stoker for any boiler capacity from 3,000 to 400,000 pounds steam per hour.

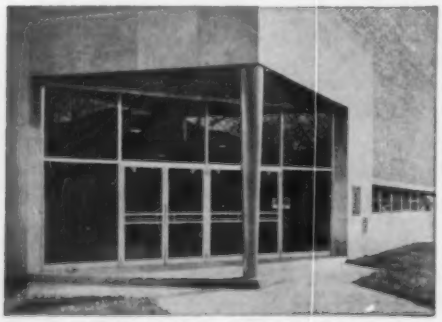
DETROIT STOKERS COST LESS: COST = INITIAL INVESTMENT + UPKEEP + PRODUCTION LOSSES DUE TO EQUIPMENT OUTAGE. THE TOTAL IS LESS WITH DETROIT.

DETROIT STOKER COMPANY

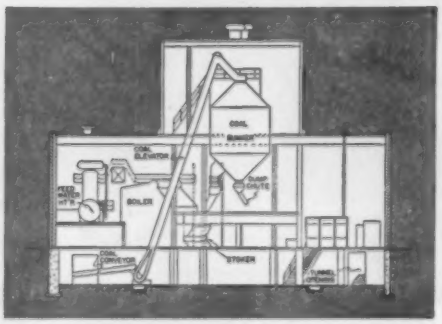
MAIN OFFICE AND WORKS • MONROE, MICHIGAN

District Offices or Representatives in Principal Cities





Entrance to unusual "little Pentagon" structure. This shape gives maximum space utilization and allows one-man central control of all boilers. Construction provides comfortably for three 31,000 lb/hr boilers and allows for two similar units in the future, within 7,000 sq. ft.



Elevation shows how coal moves from incoming conveyor by 25 ton/hr. Stephens-Adamson Redler elevator to overhead bunker (capacity 125 tons). Coal feeds from here to scales, then directly into stokers. Bunker and scales by Beaumont Birch Co.

Coal is brought in by rail and unloaded into track hopper. From here, a Stephens-Adamson conveyor carries the coal into the plant and internal coal handling system.

Hospital cures fuel ills with "little Pentagon"

Richmond State Hospital burns coal for economy and availability in modern pentagonal power plant

After a power system failure at the Richmond State Hospital, Richmond, Ind., the administration conducted an engineering survey of its steam-generating operation. Over-age equipment indicated the need for entirely new facilities. The shape of the boiler room site prompted the unconventional pentagonal installation for best possible adaptation of space to present and future needs. *Economy* and *availability* dictated the choice of coal as the fuel.

Today a new power plant—designed by Fleck, Quebe and Reid, Indianapolis, with F. B. Morse, of Purdue University—burns coal in a completely modern, automatic operation. The outstanding features of this compact installation are its high combustion efficiency, minimum manpower requirements and continuing ease of maintenance.

Coal is lowest cost fuel

Today, *when the annual cost of fuel often equals the original cost of the boilers,* you should know that bituminous coal is the lowest cost fuel in most industrial areas. And modern coal-burning equipment gives you 15% to 50% *more* steam per dollar, while automatic operation trims labor costs and eliminates smoke problems. What's more, tremendous coal reserves and mechanized mining procedures assure you a constantly plentiful supply of coal at stable prices.

Consult an engineering firm

If you are remodeling or building new heating or power facilities, it will pay you to consult a qualified engineering firm. Such concerns—familiar with the latest in fuel costs and equipment—can effect great savings for you with the efficiency and economy of coal.

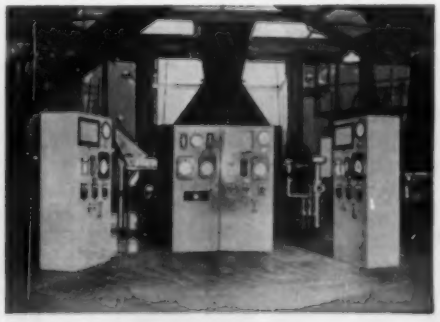
Technical advisory service

To help you with fuel problems, the Bituminous Coal Institute offers a free technical advisory service. We welcome the opportunity to work with you, your consulting engineers and architects. If you are concerned with steam costs, write to address below or send coupon. Ask also for case histories booklet, complete with data sheets. You'll find them informative.

BITUMINOUS COAL INSTITUTE

Department SP-10, Southern Building, Washington 5, D. C.

See our listing in *Sweet's*



Shown are three Henry Vogt boilers, fed by Laclede chain grate stokers, with individual control panels. Controls are pneumatic type, by Copes Vulcan. From boilers, ashes are moved pneumatically by United Conveyor Ash handling system to silo for disposal.

SEND COUPON FOR NEW BCI PUBLICATIONS. Guide Specifications, with complete equipment criteria and boiler room plans:

BITUMINOUS COAL INSTITUTE
Southern Building, Washington 5, D. C. SP-10

Gentlemen—please send me:

☐ GS-1 (low-pressure heating plant, screw-type underfeed stoker); ☐ GS-2 (high-pressure heating and/or process plant, ram-type underfeed stoker); ☐ GS-3 (automatic package boiler for heating and process plants). ☐ Case histories on larger plants.

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

Case 1 — Louisiana Utility

Training Time Cut 40 to 60%

By H. J. GUILLORY, Production Superintendent
and W. J. WATTS, Results Engineer
Central Louisiana Electric Company

A MAJOR PROBLEM of the production department is the proper training of operating personnel to prepare them to take over the operation of a shift in the shortest time possible. This is particularly true on a system which is growing at a rate of approximately 14.5% per year such as we have experienced.

The problem is further aggravated on smaller systems that don't have a multiplicity of plants with a large manpower reservoir to draw from when it is necessary to fill the personnel requirement of a new plant.

During the past several years we have tried several methods of training operators, some of which were not very successful. From the experience gained in these courses there has evolved a procedure which we feel adequately fills our company's need for properly trained operators in minimum time.

Original Program

In 1948, our production department's training program consisted of a company sponsored correspondence course in steam electric operations and on the job training. This course was administered and supervised by a nationally known correspondence school.

This type of training required a considerable length of time to prepare men to assume the duties of a power plant operator. In order to keep prepared to meet the ever-changing operational requirements of our system, it was necessary to supplement this correspondence course with lectures conducted by plant technicians.

Supervised Program

Our company had no control over the actual hours devoted to study and each individual was more or less on his own. Actual time consumed by some of the employees to complete the course was about 4 years for the slower individuals. This type of training proved to be very unsatisfactory and was eventually discarded.

It was soon realized that, in order to keep abreast of company growth, our training procedure would have to be revised. Consequently the original correspondence course was changed to a company-supervised training program.

The material used for the revised course consisted of the following text books:

(1) Practical Heat — by Croft
(2) Steam Boilers — by Croft
(3) Steam Power Plant Auxiliaries and Accessories — by Croft
(4) Steam and Gas Turbines — by Skrotzki and Vopat
(5) Basic Electrical Principles — by Maurice Sufforn

In addition to the above text material, training aids such as films, film strips and diagrams of major plant equipment were used. The text book material was made to coincide with existing plant operating conditions. On the job

training with close supervision was provided to all trainees.

One of our results engineers was assigned as instructor and course coordinator. This system of training consisted of weekly written homework and 2 hours of classroom work every 4 weeks. Classroom presentations included lectures and discussions, the latter being stressed.

Written examinations were given at each classroom meeting covering all material studied in the previous 4 weeks. Each examination was discussed after the papers had been corrected, graded and grades recorded. Duration of this course was 18 months.

Although the entire program was supervised and the homework was directed by company personnel it still was not a satisfactory means of attaining our objective. The most undesirable features of the program were: (1) The program was too slow as the course lasted about 18 months and, (2) some of the slower students fell behind as they did not have the benefit of an instructor's help at all times.

Present Program

As the company supervised program did not give us the results desired, it was decided to again make a change in our training procedure in order to keep sufficient men trained to supply manpower requirements as new units were added to the system. The actual course material remained the same, but new trainees were required to absorb this material at an accelerated pace.

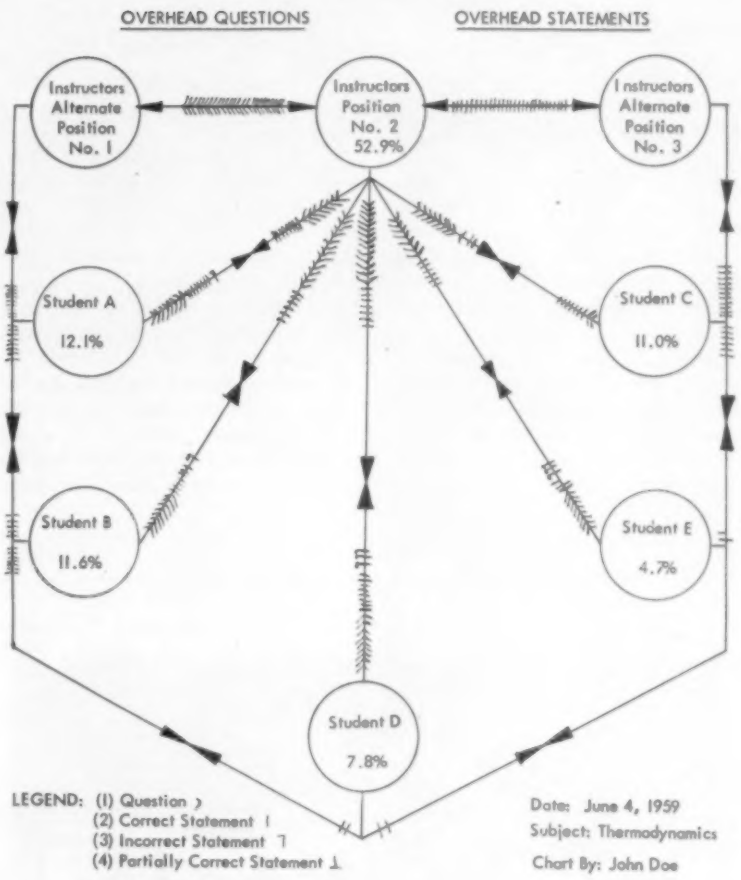
The revised course procedure was as follows:

A new group of trainees was divided into 2 groups. Group A attended classes for 4 hours per day, 5 days per week, and performed field work for 4 hours each day, while Group B obtained on the job training on an operating shift. At the end of a 4 week period, the two groups alternated with Group B attending classes and Group A working on a regular shift.

With this procedure only 6 months is required to complete the course. It is felt that an average employee who completes this course in 6 months is as fully advanced, technically, as the employee who completed either the original correspondence course which required up to 4 years or the first type of company-supervised course which required about 18 months.

Upon completion of the course, an employee is awarded a certificate and allowed to keep all text material as his personal reference library at no cost to the trainee.

CENTRAL LOUISIANA ELECTRIC COMPANY, INC.
TYPICAL PARTICIPATION CHART



Participation Chart

In addition to the training aids used for previous classes, a new type of aid was used for the last group of trainees. This was in the form of a participation chart which is plotted periodically by someone other than the instructor. A participation chart such as the accompanying illustration includes the following information:

(a) Instructor and student's classroom position.

(b) Any discussion between students and instructor as plotted on direct line between instructor and respective student.

(c) Any overhead question or statement by instructor.

(d) Any overhead question or answer and any general statements as plotted on the chart perimeter.

A participation chart, we have found, provides a better means of observing a student's progress than tests grades and is an invaluable adjunct to the information obtained from tests given the students. It also provides information to and aids the instructor in keeping the discussion in a balanced condition by establishing his line of sight with students who are less prone to participate in the discussion.

Results can be seen by referring to the illustration which reveals that students D and E are not participating as much as students A, B and C. With this condition,

the instructor should conduct his discussion from alternate positions No. 1 and No. 2 so that his line of sight would be towards students D and E.

A participation chart will also reveal other conditions. Examples of some conditions and corrective actions which should be taken are as follows:

(a) A discussion leader who makes an excessive number of overhead statements approaching the lecture method of instruction, should concentrate on asking more overhead and direct questions.

(b) When an overparticipating student attempts to answer all overhead and direct questions as well as some questions directed to other students or to the instructor, the instructor should seat this student in such a position that the student would be out of his line of sight.

Individual	Average Participation	Average Test Grades
Instructor	57.8%	———
Student A	11.2%	93.0%
Student B	9.1%	94.8%
Student C	8.3%	96.8%
Student D	7.5%	83.3%
Student E	6.1%	61.2%

(c) A weak student who indicates that he is absorbing only a small amount of the discussion material or who never volunteers to participate in a discussion, should be seated in such a position that the student would be in the instructor's direct line of sight. Advantage of such a seating arrangement would be that the instructor would glance in his direction when asking overhead questions making him feel that the instructor expects him to answer.

The accompanying table lists the actual average participation and test grades of our last group of trainees.

Use of the participation chart has shown that there is generally a direct relationship between amount of discussion, employee suitability for the job and test grades of any particular student.

Results

Our present type of training indicates that a student can be prepared to take charge of a power plant shift in 40 to 60% of the time previously required. It is felt that we are currently giving our potential operators the maximum amount of plant technical and operating knowledge in a minimum amount of time and adequately filling our company's needs.

Case 2 — Georgia Power Co.

Field Repairs to Broken Shaft

RECENTLY a shaft broke on a 15,000 kw generator at Georgia Power Company's Bartlett's Ferry hydro-electric plant.

The shaft broke at the thrust collar and it was necessary to machine the shaft and modify the thrust support. Since the shaft and rotor were too large for lathe machining and since the shaft could not be rotated without a thrust support, the shaft was held stationary and the cutting tool was rotated. A guide jig was built to hold the cutting tool and the jig was rotated with an air motor.

By F. J. LATHAM, Supt. Bartlett's Ferry Hydro Plant, Georgia Power Co.

Case 3 — General Electric's Appliance Park — Louisville, Ky.

FACILITIES PROBLEMS for Large and Small Plants

By **JOHN VONDERHEIDE,** Manager-Plant Engineering
General Electric Company, Appliance Park, Louisville, Ky.

APPLIANCE PARK at Louisville, Kentucky, has been publicized from just about every viewpoint connected with modern industrial facilities. Most often referred to as a "mammoth" plant, it occupies approximately 1,000 acres, including five million square feet under roof, 100 acres of paved roads and parking area, 100 acres of arboretum and lawn, 18 miles of railroad, plus other tremendous scope facilities.

First opinion of interested readers has been that this huge appliance manufacturing center is in a problem category all alone and that features have little bearing on the average small or medium size industrial plant. This report, based on about 5 years of full operation at Appliance Park, may well show that there is really little difference in facilities design objectives.

Industrial Community

A close look at Appliance Park establishes that this is not one huge plant but really an arrangement which can well be identified as a group of varying size production departments planned to form an industrial community.

There are six individual manufacturing buildings which are set up as self-sustaining operating plants, with managers in each case who have the direct responsibility for and control of the flow of inbound raw materials and the delivery of finished appliance products. Another important park "resident" is the sales and distribution department which accepts the finished products from the various buildings for warehousing and/or shipment.

All of these individual plants do "buy" their utilities, facilities convenience services, and plant engineering from a park "landlord" department, presently identified as the relations and utilities operation. This latter function can best be described as the "community" management. Decentralization inside the General Electric Major Appliance Division works to a maximum degree under this described layout.

Early mention of the word "park" in connection with the construction of the Louisville venture was not always easy to understand, but now a close look does offer sound reasons for the idea. Like other cities, Louisville was interested in encouraging industrial growth, but with the fear that large industry within close limits of good residential area might be a problem. General Electric was a welcome "newcomer" because of demonstrated experiences in avoiding old-line industrial ills.

Appliance Park provided a beautiful setting for all buildings, keeping well back from property limits, installing adequate trees and shrubs for yard beautification, and even included a border strip around the whole site which remained zoned against industrial construction.

The park concept also included the development of arboretum areas which have proved beneficial to the community from an educational and civic-pride standpoint. Such important aspects as noise control, air pollution control, convenient access, plus long-range coordination of traffic flow problems, were all treated.

Appliance Park management does not hesitate to confirm that the park concept also offered extremely important benefits to the General Electric Company. The greatest return came from the elimination of dust and dirt which

might interfere with product quality, but the good will of the community neighbors and the ability to maintain extremely high-level of employee pride and job morale proved to be an additional welcome reward. Other park features included the opportunity to provide better control for basic facilities such as storm water, with gain of long-range water conservation opportunities.

Facility Features

Some of the Appliance Park facilities designs were considered a bit radical, but experience now shows that the benefits have outweighed the problem areas.

The main parking lot arrangement provides for the handling of about 10,000 cars per day but uses only two points of entrance and exit. Internal one-way traffic routes with adequate interchange had to be included. Performance to date shows that this heavy traffic flow can move within a matter of 12 to 18 minutes during peak periods and that the idea of passenger pick-up stations, radio-controlled protection vehicles, adequate lighting, etc., are valuable assets.

Traffic interference has been minimized at junctions with public highways, and only two guard control stations are needed to handle the main employee surveillance. All parking areas are constructed with bituminous paving which provides for low-cost long-range maintenance.

Loop System

The "loop" theme which was used for all internal roads and primary utilities layout has proved to be an extremely important design feature. Operating experience has shown that the ability to feed any building by the several routes provided has avoided operation interruptions on a number of occasions.

In connection with the utilities, the flexibility gain alone has well offset any original capital investment premium, because it is an established fact that modern-day high-speed industrial production results in utilities demand changes on short notice.

Module pattern for building location has also proved to be an important design concept at Appliance Park. The major production buildings were located at the same ground elevation and matched for building column spacing so that any buildings could be conveniently joined or superstructure facilities designed with minimum engineering difficulties. In addition, the module arrangement provides for projected expansion. And, even in this short period, several building additions have been made. Future planning can continue without any serious danger of interference of over-all park operations or planning.

Water

Right from the start, the Appliance Park mill water system created much industrial interest. This system catches rainwater from the roof areas and large lawns and carries it via normal storm water sewer system to reservoirs where it is treated and returned for use as process non-potable water.

This system is of the recycle type so that the water is used over and over, being cooled at the mill water pumping station. This same system also provides park-wide fire protection service.

Much concern was expressed regarding the possibility of high turbidity conditions ruining the advantages of such a system, but experience has shown that the idea was sound because general turbidity limits fall in the range of 50 to 75 ppm and that even these particles can be filtered out.

This water represents more than two-thirds of the over-all plant requirement and is "sold" to the various plants at less than one-half the cost of potable water purchased from the City of Louisville. Daily potable water needs, purchased from the city, still approximate seven million gallons. This whole system offers a splendid opportunity to work toward additional water conservation in the years ahead.

Air Conditioning

Heating and ventilating high-level industrial buildings is never an easy task; Appliance Park buildings were equipped with facilities which would provide for positive pressure, after compensating for process exhaust units.

Heating was accomplished by the use of overhead unit heaters. This plan has worked very well, but plant layout changes and growth have caused heavy obsolescence of other equipment used overhead, and the system has been difficult to maintain. Later designs used in the park have included the use of roof area to accommodate this type of mechanical equipment and improvement has been very significant.

Satisfactory results were really achieved by adoption of air handling systems to care for the worker zone — about 20 feet above the floor being the height consideration. Small service buildings were originally equipped with ventilation systems but the substitution of room type air conditioning units was soon found to be economically sound and most desirable.

The Park office building air conditioning systems were of the central sectionalized type in the earlier buildings but, again, the application of small package and room air conditioner units was found to be considerably lower in first cost, operating cost, and a dollar saving feature at the time of rearrangement. This design was used in all later buildings.

Electrical System

The electrical system was designed to carry primary service directly to several terminal points in each building. This minimized the need for extensive secondary system and provided maximum flexibility. This plan has shown up as being entirely satisfactory.

The use of low-level series type road lighting has been adopted in lieu of the original high floodlight towers.

The use of underground electrical feeders, wherever interlock type cable could not be used on existing structures, has proved to be both protective for the system and more satisfactory from an operational viewpoint.

Roof insulation, 1" thickness, tinted sun-control glass, reflective aluminum siding, standardization of floor capacities, have all been proven to be sound design features.

The benefits of this practical experience may possibly serve as an important guide in the construction of facilities of the future.

Case 4 — Texas Machine Shop

SIX to TWO

By DENNIS WUNDERLICH
Plant Superintendent
Hahn & Clay, Machine
& Boiler Works
Houston, Texas

The disassembled rotor being inspected.

RECENTLY one of our customers was faced with a serious loss in production, when a large multi-stage steam turbine broke down. The first estimate, using normal procedures, was that the turbine would be out of service a minimum of six weeks.

In analyzing the situation, it was determined that the rotor spindle was damaged beyond repair, but the rotor discs could probably be re-used.

The problem then resolved itself into two phases. One, to obtain a low alloy forging 10" in diameter by 13' long, rough machine it, magnaflux, heat-treat, make material strength tests, finish machine, re-magnaflux, and grind the spindle. The second problem was to correlate the above activity, time wise, with the transportation, dismantling, inspection and balancing of the remaining rotor parts, so that no time would be lost.

In maintenance work of this type, it is imperative that the necessary equipment, such as large lathes, horizontal millers, and balancers be available. It is equally important that the necessary manpower and supervision be scheduled to efficiently operate the equipment.

Since the detail story of how the repair of the turbine was accomplished would require many pages, the three photographs tell the SIX to TWO story much more graphically than could any number of words.

Photo number one shows the original shaft, along with the fourteen rotor discs, completely disassembled. A special mandrel is being fitted into one of the discs, preparatory to individual balancing, and prior to assembly onto the new spindle. The Dynetric Balancer, in the background, with its 68" diameter by 22'6" long capacity, easily and efficiently handled all of the balancing.

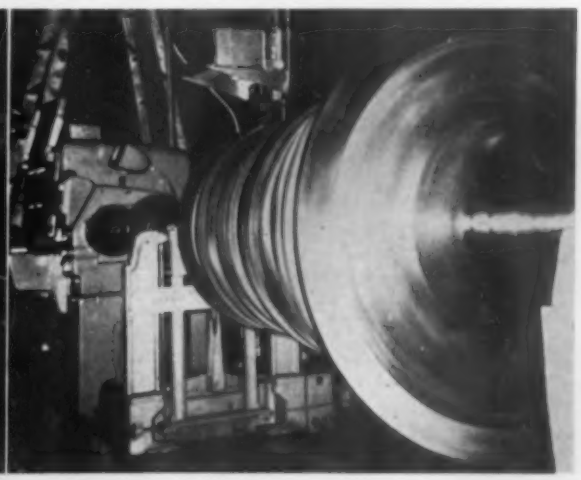
Photo number two shows the machining of the spindle nearing completion.

Photo number three shows the completely overhauled and reassembled rotor, whirling vibrationless, in the final balancing operation, only two weeks after the start of repair.

Reduction of the complete overhaul of this multi-stage steam turbine rotor, from an estimated SIX weeks to TWO weeks, was the result of a carefully planned, efficiently manned, and expeditiously executed procedure, typical of the type of service available to Southwestern industries, by HAHN & CLAY in Houston.

Final machining operation on spindle.

Rotor whirling in balancing machine.

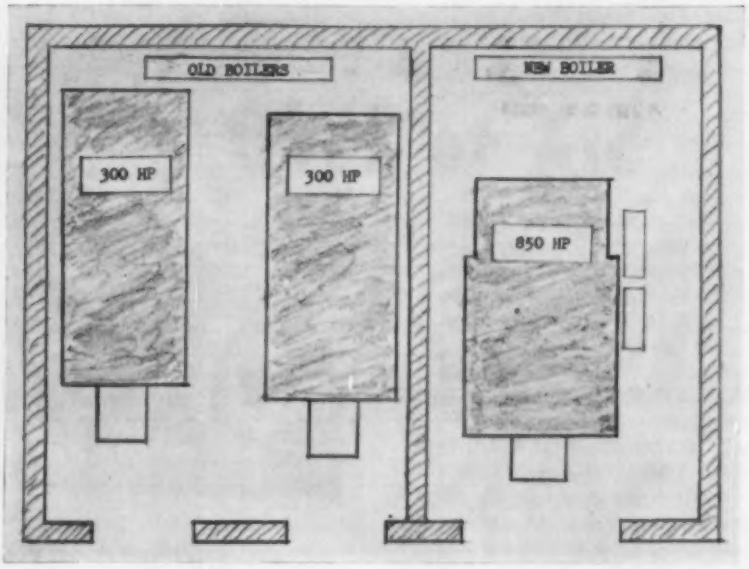


Case 5 — North Carolina Mill

Less SPACE

More POWER

Better OPERATION



This sketch shows small space requirement of the new boiler in comparison with the old ones.

RANDOLPH MILLS, INC., Franklinville, N. C., has placed in operation a new boiler which has 40% more capacity and which occupies only half the floor space of two old boilers.

The mill manufactures bleached, dyed, and printed color fabrics. The process equipment demands cause rapid load swings which are handled effectively by the new boiler. Steam pressure varies only 3 or 4 psi from the 125 psi operating pressure.

Before the new boiler was installed, the steam load exceeded the capacity of the two stoker-fired, water-tube boilers which developed 300 bhp each, and the steam pressure often dropped from 125 to 50 or 60 psi. Furnace brickwork was punished by overloading, and frequent repairs on weekend overtime were costly. Production output in the plant suffered, and frequently the sanforizing machines were slowed down. In cold weather, reduction in plant output was experienced.

An engineering survey of boiler load requirements was made by The McPherson Company, Architects and Engineers, Greenville, S. C., followed by plans and specifications.

A single modern boiler unit was obtained and installed. It is the Babcock & Wilcox Integral-Furnace Boiler Type FF unit equipped with Detroit Double-Retort Underfeed Stoker and Diamond Soot Blowers. Rated continuous capacity is 28,000 lb/hr steam flow, equivalent to 85 bhp.

Bailey pneumatic control system with panel board, remote selector switches, and meter for recording flow and pressure were installed. An American Blower induced draft fan and a new stack provide draft for the boiler. The boiler is equipped with Yarway seatless blow-off valves.

Also, a new Cochrane feedwater heater was added to supply properly deaerated feedwater.

The new boiler incorporates the watercooled furnace principle, with all four walls and roof watercooled to assure high efficiency with low maintenance. These furnace cooling tubes contain boiler water in circulation and they absorb heat and generate a substantial amount of steam in addition to protecting the refractory work.

Thus, for the required capacity and efficiency, a much smaller boiler bank is used than in the old type boilers. These features together with the insulated steel-cased setting of the "thin wall" type, are combined to provide a unit so compact that the single new unit occupies the same floor space as one old boiler, yet produces 2½ times the amount of steam. The height of the old and new units are about the same.

Obviously a high capacity stoker is necessary for this type of operation, and this need was met adequately by use of the Detroit double-retort underfeed stoker.

Although the old boilers were retained for standby use, the new Integral-Furnace Boiler has proved reliable and the old units have not been fired since the new boiler was started up.

Case 6 — Texas Utility

Glare and Heat Reduced

EFFECTIVE and economical solutions in controlling heat and glare from the sun are being adopted by plants of a large Texas electric utility company through the use of a new product called Sun-X Glass Tinting, which is a transparent liquid plastic that is applied to existing glass windows by a unique flow-on process.

Several employees in one of the utility company's plants had com-

plained about bothersome glare. The employees had complained of headaches and eye irritation caused by glare from the sun.

The plant manager realized that there was a loss in employee efficiency because of the glare, which prevented use of certain plant areas in the plant during the day. The manager felt that awnings, blinds, and draperies would not fit into his plans. He wanted to solve his problem at the source of the trouble — on the glass itself.

Du Pont Sun-X was applied to the inside of the windows in a "Glare Green" shade. The dealers who made the application were Frederick A. Fleming, Jr. and Charles Miller, both of Houston. Materials were supplied by American Glass Tinting Corp. of Houston.

Tests showed that glare was reduced 54%, and a bonus was realized through reduced air conditioning costs. There was a 38 per cent reduction in heat from the sun's rays — and this meant a substantial savings in air conditioning costs.

Case 7 — Alabama Paper Mill

Controls For Bleach Plant

THE NEW 5-stage bleach plant at Marathon Southern's Naheola, Alabama mill can produce 100,000 tons of fine quality bleached sulphate pulp per year. Further, this plant is one of the most completely instrumented in the country. Marathon selected Bailey Meter Company to supply the instruments and control systems.

From a centralized control room an operator has a complete picture of the entire plant's operation and has fingertip control of all important variables. The instrument and control panel for the bleach plant is divided into two sections, viz., the recorder section and the functional graphic section.

Recorders, arranged in three rows for efficient use of panel space, provide continuous chart records displaying the trend as well as the instantaneous value of each variable.

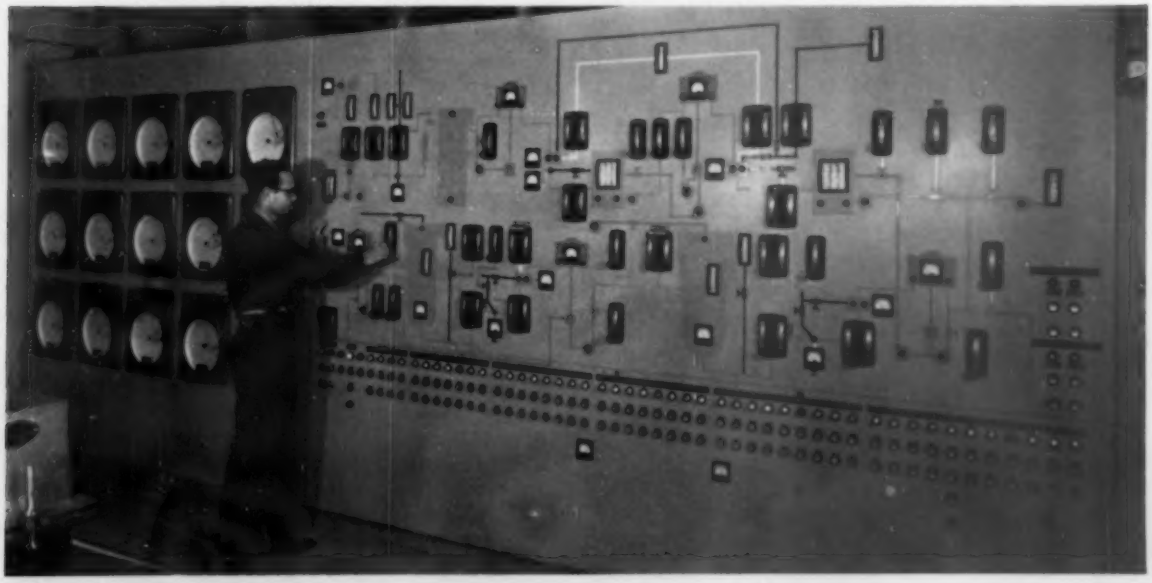
The functional graphic section shows the entire process at a glance and permits the operator to have complete fingertip control. Some of the more important controlled variables include stock consistency, stock flow, bleach liquor flows, stock temperatures, and dilution water flow.

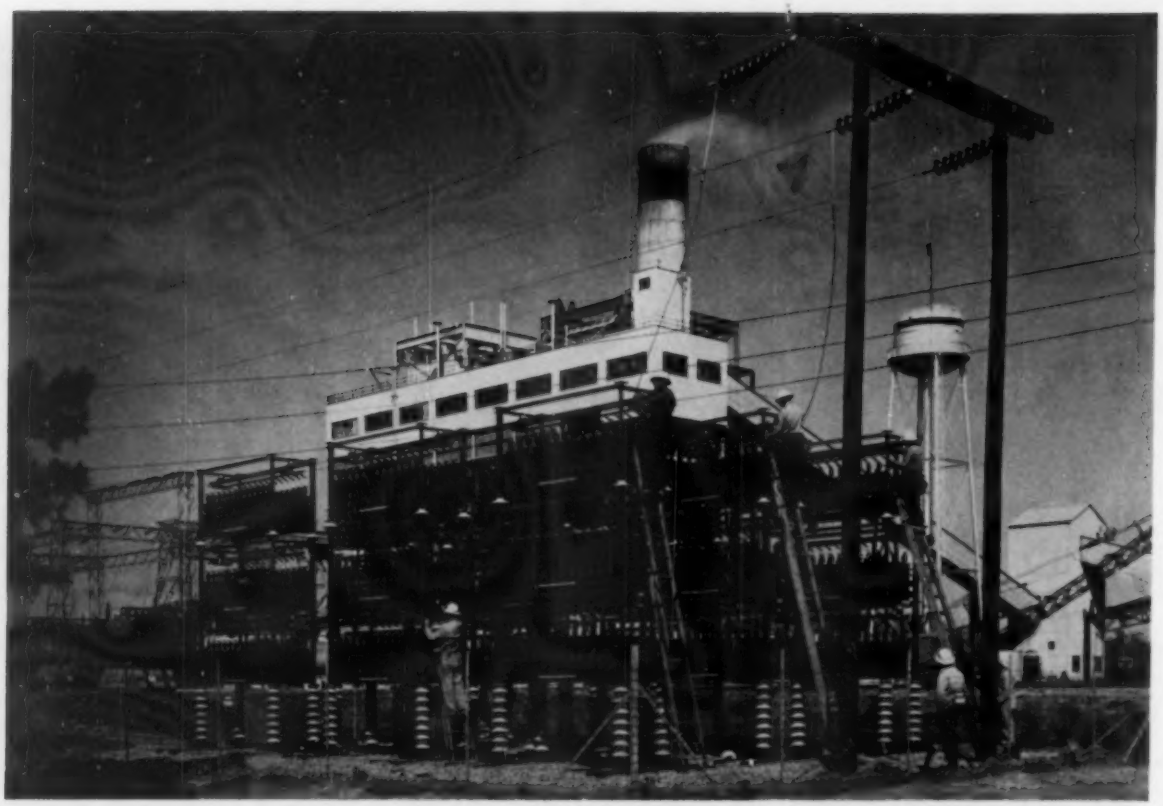
The control room also contains the high density bleached stock control panel. From this panel, the operator can automatically supply consistency-controlled stock from any of the four high density storage towers to any of the semi-bleach, pine bleach, or gum bleach pulp chests in the paper machine room on a ratioed flow basis.

Desk type consoles are provided for each of the five vat bleach washers. These consoles are provided with automatic washer vat level control, a rather new innovation in the bleaching process.

The automatic control system and other quality control elements have combined to help Marathon produce uniformly high quality hardwood and softwood pulps.

An operator changes the set point of one of the automatically controlled variables at the functional graphic section of the 5-stage bleach plant control panel at Marathon Southern Corporation's new mill at Naheola, Alabama.





Case 8 — North Carolina Public Utility

Massed Capacitors Help CP&L Hold Its Voltage

CAROLINA Power & Light Company has this year introduced a stepped-up use of capacitors to counteract forces tending to cut down voltage between generating plant and customer.

CP&L's latest, and largest, installation of capacitors is a bank of 684 units with a capacity of 32,400 kilovars at its Goldsboro steam-electric generating plant. Here capacitors serve to keep the plant's generated voltage at a high level of efficiency as it flows out to area customers.

Company officials report that new lines are continuously going up to deliver power for more electric motors and machines. With each new load there is an accompanying voltage drain upon the company's system.

Motors in refrigerators, washing machines and air conditioners tend to reduce voltage on the lines. The capacitor, which produces wattless power, helps keep voltage at its proper level.

CP&L management says every fraction of a generated kilowatt saved between the generating plant and the customer's watt-hour meter is an ultimate saving to the customer.

Case 9 — Alabama

Safety Hook Aids Truck Loading

THE SHIPPING Dock at Chemstrand's Acrilan acrylic fiber plant at Decatur, Alabama, now has an added feature which makes the loading of trucks safer and easier.

Each of the six adjustable loading platforms has been outfitted with a pair of one-inch round steel hooks designed to fit the outside tire of a dual wheel truck of standard commercial size. Each hook consists of two prongs with an included angle to give good frictional holding without sliding over the tire. Each hook is further designed to span the width of each tire neatly and turned down to fit between dual wheels for added security.

Each hook, one on either side of each platform, is connected to a three-eighths (⅜") inch welded link chain which is further secured to a four-inch I beam fastened beneath the loading dock and attached behind the dock foundation. A high strength ratchet with aircraft cable is attached to the chains

for securing carriers against the dock and acts as a booming device for each chain.

The device also holds the rear end of trailers snug against the dock so that they no longer tip when lift trucks drive into them with the first load. It also makes doubly certain that the trailer will not move away from the dock during loading.

The new safety device is simple to apply and when not in use can be stored beneath the loading deck.

This added feature is used in conjunction with the conventional safety equipment.

By WILLIAM T. HILL
Civil Engineering Supervisor
The Chemstrand Corporation
Decatur, Alabama

Case 10 — Memphis, Tenn.

Painting Without Splatter

A GOOD EXAMPLE of modern product finishing and material handling is the streamlined system for automatically painting lighting fixtures at the Light & Power Utilities Corporation, Memphis, Tenn.

The Ransburg No. 2 electrostatic spray process is used here to finish over 500 fluorescent fixtures an hour, applying a uniform coat of paint as fixtures move smoothly along an overhead conveyor line.

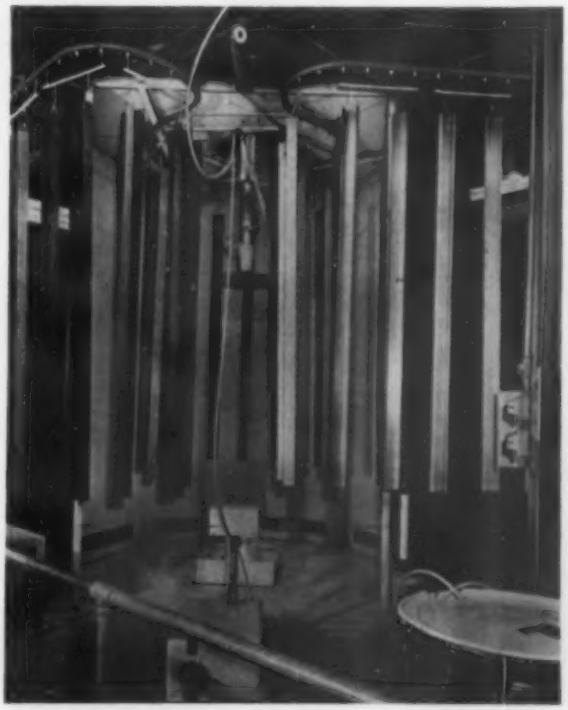
The unusual conveyor, manufactured by the Chainveyor Corporation, is routed almost anywhere to conform with building layout and painting requirements. The conveyor line curves, dips, and makes 180° 16-inch radius turns as it carries parts through a series of finishing steps.

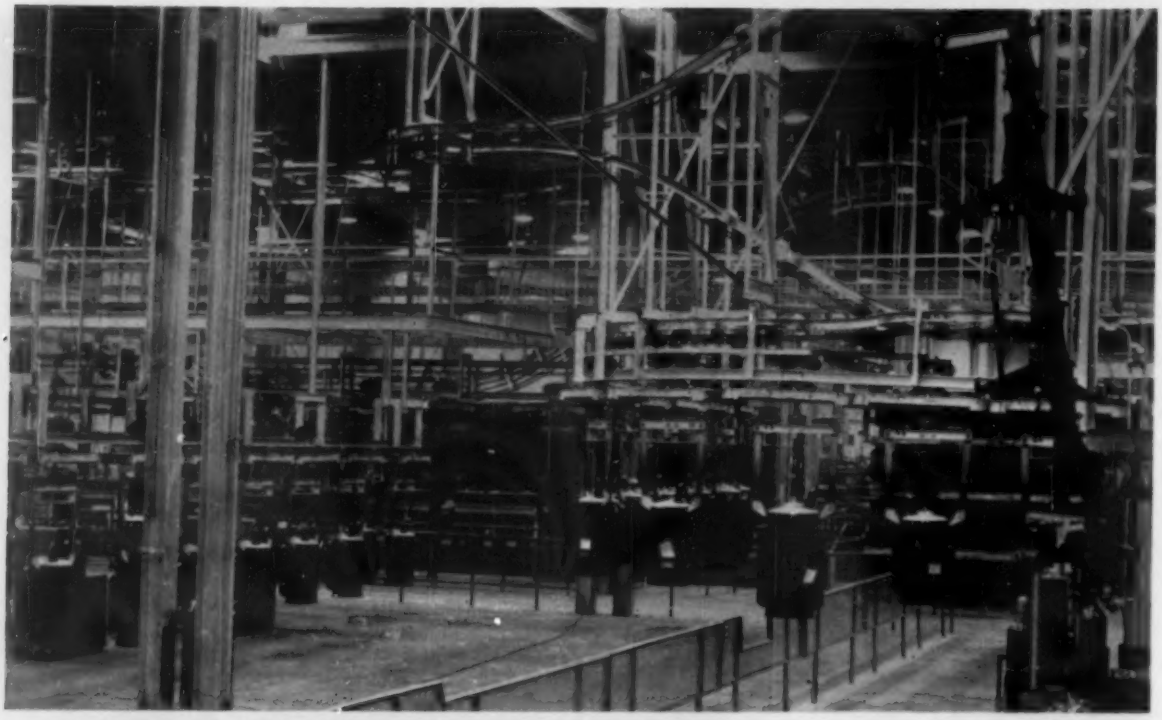
After assembly, steel lighting fixtures are loaded on carriers transported by the 300 ft Chainveyor system. They move first through a degreasing operation, then through a phosphate coating that prevents rust and gives better adhesion to the paint.

Fixtures continue on without interruption to a paint booth where they are given a quality finish by the 100,000 volt electrostatic process. In this unique process, paint is pumped to a rapidly rotating disc which is charged with high direct current voltage. An electrostatic field is thus established between the disc and the part to be painted.

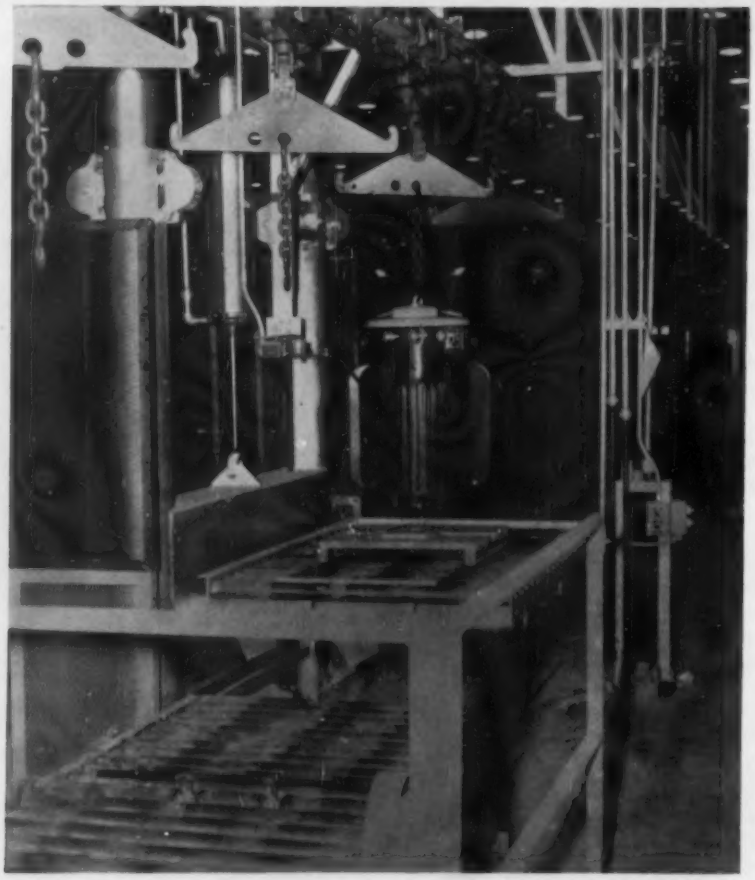
Since the conveyorized loads are electrically grounded, the paint whirling off the disc is attracted as if by a giant magnet. The result is a curving spray of paint that completely covers the parts without wasteful "fall-out." Nine fixtures a minute pass the spinning disc, receive an even coat of paint, and flow along the Chainveyor line to the bake oven.

According to reports, the electrostatic process provides a more uniform and attractive finish with considerably less waste than other painting methods. The Chainveyor system is also praised by plant management for yielding the triple benefits of production speed-up, reduced operating cost and manpower savings. The Chainveyor system replaced an outdated electric hoist & turntable method and has operated relatively trouble-free for over two years.





Overall view, showing main 4 x 4 power and free conveyor. Free line at left is in the repair area following testing on the automatic test wheel. At right is the spring pusher conveyor storage line, with transformers awaiting leak test. At far right is the 6" monoveyor used for final delivery, and in background is the pallet conveyor for automatically loading cores on to the 4 x 3 power and free core carriers.



Automatic unloading of finished transformers from 6" monoveyor at crating and shipping area in the Athens transformer plant of Westinghouse Electric Corporation.

Automated Production of Distribution Transformers

THE HIGH RATE of building construction experienced in recent years has brought about a tremendous growth in the market for distribution transformers. As a result of this growing need, the Westinghouse Electric Corp. has increased its manufacturing capacity by modernization of some existing facilities, and by the establishment of a new and highly automated transformer plant in Athens, Ga.

The Athens location was selected for the purpose of better serving customers in the Southeast Atlantic states, and because there was an ample labor supply, a desirable cultural atmosphere, and for other similar reasons.

This plant, initially intended to produce 5 to 167 kva pole-type distribution transformers, has now increased the capacity range to 5 to 333 kva because later development proved the feasibility of using the same lines for producing the wider capacity range.

Key equipment used to effect the high degree of automation in the Athens plant is the complex material conveying system supplied by Mechanical Handling Systems Inc., and worked out by their engineers and those of the Westinghouse Electric Corp.

The conveying system uses conveyors of many types, including overhead 6" monoveyors, overhead power and free conveyors, subfloor tow lines, pallet conveyors, roller conveyors, automatic loading and unloading devices, turnovers, etc. It is impossible to describe the system in a brief article, but the result has been a highly satisfactory increase in production over the older methods formerly in use at other locations.

Transformer tanks, for example, can be fabricated at rates up to approximately 30 per hour over a single, integrated production line.

The excellent results being obtained at this plant are an outstanding example of what can be achieved by advance planning for new facilities, utilizing the most modern techniques in material handling and production.

Case 12 — South Carolina Paper Mill

Stoker Burns By-Product Waste

BOWATERS Carolina Corporation in the new mill at Catawba, South Carolina, employs Detroit RotoGrate Stokers to burn bark waste.

Up to 200,000 pounds of steam per hour is generated from bark burning alone. And with oil or gas burners in the furnace walls 300,000 pounds of steam per hour is realized when using either of these fuels for auxiliary firing.

The installation is designed for future burning of coal on the same stoker, which will then burn a combination of bark and coal or either of these two fuels separately.

The refuse fuel is introduced to the furnace through air swept distributing spouts specially designed for this use. The fuel which may run to as high as 50% moisture content is thoroughly mixed with air for combustion and light or fine particles burn in suspension while the coarse heavier material burns on the grates. Continuous ash discharge by the forward moving grates permits higher burning rates and sustained high efficiency.

Burning of this by-product refuse under a steam generator not only solves the disposal problems, but transforms waste that would otherwise be a costly nuisance into a valuable fuel.

The RotoGrate stoker for continuous ash discharge and Roto-Stoker with grates for intermittent cleaning have both been used extensively for burning refuse of various kinds such as bark and other wood refuse from pulp and paper and wood working plants, bagasse from cane sugar mills, spent coffee grounds left as residue from manufacturing of soluble coffee and many others.

Case 13 — Florida Concrete Block Plant

Special Steam Lines Help Steam over the Peaks

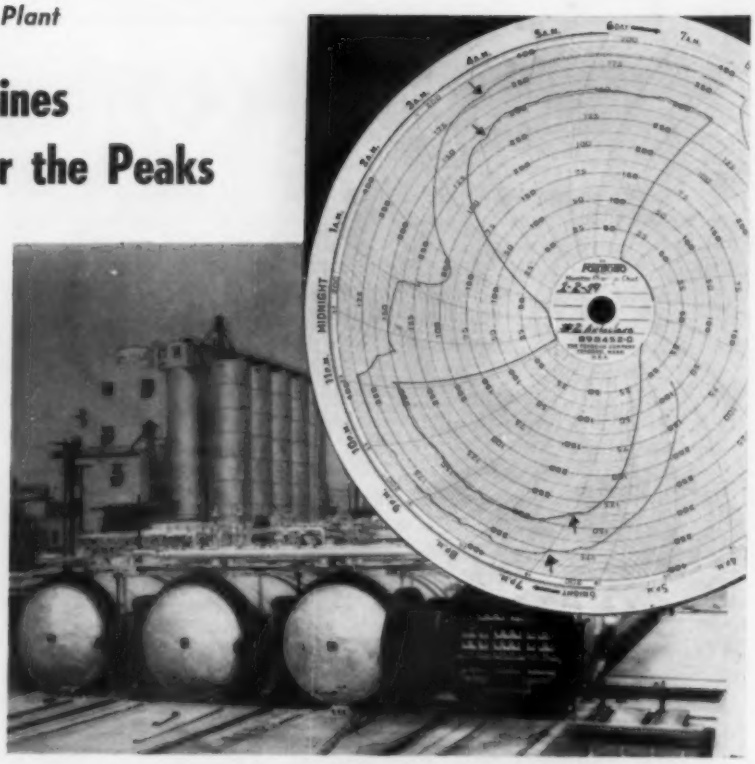
BY CONNECTING two steam boilers (one of 456 bhp and one of 136 bhp capacity) independently to each of four new Chicago Bridge & Iron Co., autoclaves — using the big one for just the first heavy-demand part of the process cycle and the other only for the last holding part of the cycle. — Tampa Sand & Material Company has been able to keep up with production rates which would normally require 20 per cent more boiler capacity.

The idea may well be applicable to other industries where increased production is straining existing steam facilities.

Improved autoclaving methods developed cooperatively between Tampa Sand and Chicago Bridge & Iron Company have: (1) increased productivity of Class A block by over 25 per cent, (2) reduced the cement content of block by 40 per cent while increasing block physicals, and (3) achieved 3 full cycles per day of production per autoclave.

All four autoclaves simultaneously (but on staggered schedules) require steam to bring them to 365 F (150 psig) in 2½ hours. It is then necessary to hold the heat at this level for 4 hours. Only 1½ hours is therefore allowed for blow-down, unloading, checking, reloading and closing the clave again — if one is going to keep up with 3 full cycles per day per clave.

Simply connecting the two boilers in the usual way — to a common header — wouldn't do it. It was impossible to build two claves at once while holding the other two simultaneously. However, by running an additional steam feeder line from the little boiler to the bank of claves — totally independent from the feeder line from the big boiler — Tampa could turn the trick. The big boiler would "build" to 350 F and be automatically disconnected from that clave; then the little boiler (through its separate line) would take over.



Arrows show points at which big boiler (for "building") cuts out and little boiler (for "holding") takes over.

Although this boiler-stretching stunt seems to be "getting something for nothing," it works because the independent steam lines prevent steam from those autoclaves which are "holding" from feeding back through a common header into those which are "building" at the same time.

Case 14 — Georgia Pulp Mill

Special Handling Equipment for Wood Chips

SOUTHERN saw mills and veneer mills are now linked with pulp mills and other users of wood chips in a program for better utilization of wood leftovers, a program that means economies and higher profits for both groups.

The saw mill salvages slabs, edgings, end trim and other waste, runs this material through a chipper, screens the chips and then sells the chips to pulp mills and other users.

The roofing plant of Certain-Teed Products Corporation at Savannah, Ga., formerly purchased whole logs to produce the chips used in making the dry felt which is used in asphalt roofing. This plant, which operates 24 hours a day, produces roofing rolls and shingles.

Recently this plant switched over to purchased chips, and each day it now receives chips from veneer mills in Baxley, Ga., and Wadley, Ga., each about 100 miles from Savannah. These mills now

Chips from veneer mills are delivered to the Certain-Teed Products Corp. roofing plant in Savannah, Ga.

produce gumwood chips from cores, slabs and other wood waste.

Link-Belt Company furnished an unusual outdoor storage and conveying system to handle these chips. The system, which includes a hoist for rear dumping of semi-trailers, is designed to move the chips quickly into storage as the trailer unloads and then reclaim the chips as needed.

The chips are stored in a concrete hopper, 70 feet long and 14 feet wide. The base, which tapers to 3½ feet, is steel-lined at the bottom and accommodates a double-strand flight conveyor. The hopper is divided into two areas — the first 15 feet for unloading and the remaining 55 feet for storage.

The flight conveyor, which is 118 feet horizontal centers, travels along the entire bottom of the hopper, then up an incline to a surge bin over a 72 inch diameter rotary table feeder, then returns over the top of the storage bin, making two vertical right angle turns at the truck loading end. Total vertical centers at this end is 22 feet.

The rotary table feeder has two plows, permitting the chips to be fed directly into the plant on a 14 inch wide belt conveyor or discharged onto a 24 inch wide inclined belt conveyor, and carried back to the top of the main storage bin. Here they are discharged onto the top run of the flight conveyor, which carries the chips over the bed of material.

This conveyor arrangement permits chips to be (1) carried directly into the plant (2) delivered to storage or (3) recirculated whenever necessary.

The flight conveyor consists of two strands of SS 150 plus bushed chain, with 6 inch channel pusher flights spaced at 24 inch intervals. The chains travel around four pairs of sprockets — two at the loading end, one at base of incline and one at discharge end. The chain slides along steel plates at the base of the storage bin and also at the top of the bin. The conveyor is driven by a 25 horsepower motor through an RC flexible coupling, double reduction helical gear speed reducer and roller chain drive.

The 15-ton hoist for dumping semi-trailers is on a carriage which travels on rails at the top of a 40 foot tower. Longitudinal movement of the hoist carriage permits it to remain directly over the trailer sling as it lifts it.

The truck is backed under the hoist tower, and the rear wheels are blocked. The trailer is disengaged from the truck and the hoist is attached to a sling which is coupled to the front of the trailer. The hoist is operated remotely from the base of the tower.

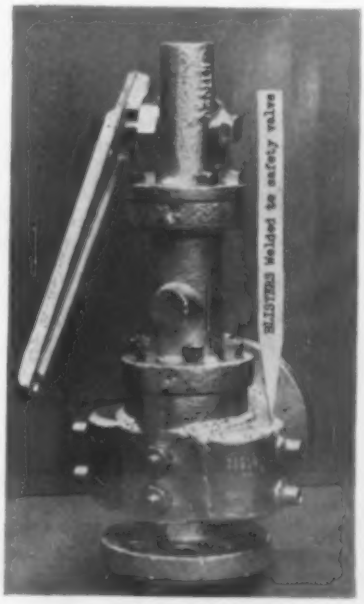
Case 15 — Delaware

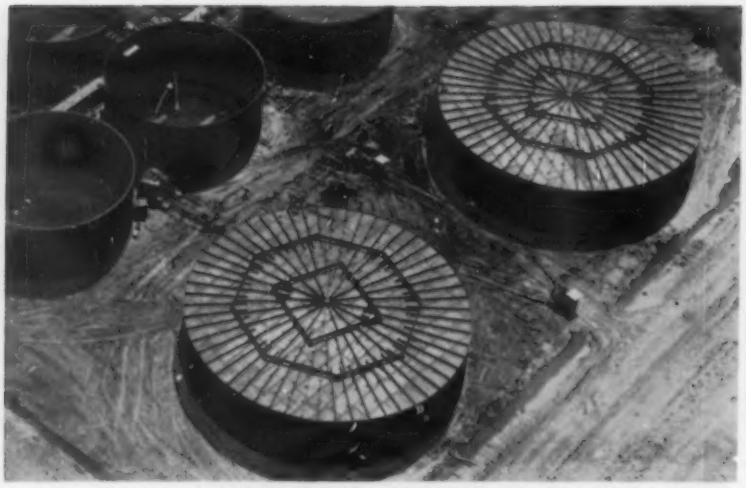
Steam Jacketed Valve

A **DELAWARE** chemical plant encountered a dangerous situation which came close to causing an accident. A heavy material flowing through their system was solidifying in the relief valves and preventing proper pressure relief. This was discovered when pressure build-up in one of their large vessels caused swelling almost to the breaking point due to inadequate relief of pressure through the valves.

In order to combat this situation Crosby Valve & Gage Company developed a steam jacketed relief valve.

The construction consists of welding blisters to the sides of the safety valve body through which steam or hot water may be piped under any desired pressure. Since the temperature of steam is a function of pressure — greater or lesser heating effects and temperature differentials may be obtained by varying the steam input pressure to the heating blisters thereby preventing the medium from solidifying and also maintaining the viscosity within proper limits.





Case 16 — Texas Chemical Plant

Special Tank Design for Caustic Storage

JEFFERSON Chemical Company, Inc. has completed a major expansion of its petrochemicals plant in Port Neches, Texas. This plant enlargement is by far the largest undertaken by the company since its formation in 1944. Jefferson Chemical is owned equally by American Cyanamid Company and Texaco Inc.

This expansion has tripled the company's production of ethylene, doubled its capacity for ethylene glycol, and increased by 50% its output of ethylene oxide.

A chlorine plant was constructed to reduce purchases of chlorine, which is used in the manufacture of about half of Jefferson's ethylene oxide. The electrolysis of salt brine results in the manufacture of caustic soda as well as chlorine. The caustic soda is marketed.

Problem

In first planning this expansion with its increase and diversity of products in 1956, it was early recognized that storage of warm 50% caustic soda presented special problems:

1—Liquid caustic soda solutions must be kept warm because they freeze at the lower atmospheric temperatures often encountered, and because the higher viscosities of the solutions, when cold, cause them to be less pumpable.

2—Liquid caustic soda is in itself corrosive, and the water vapors rising from the warm solution condense on the underside of the tank roof above the liquid and leave residual deposits of rust on the unprotected steel surfaces.

3—The structurals and roof supports usually employed for large-diameter tanks offer many interior pockets and angular areas which are difficult to protect with anti-corrosive coatings.

4—Mild steel exposed to caustics is prone to embrittlement as well as corrosion.

5—And finally, and most important of all, iron oxides resulting from corrosion cause change of color and contamination in the product.

To withstand these conditions of corrosive attack, only expensive tankage of stainless steel, or nickel, or nickel-clad would be adequate, unless special designs for mild-steel tanks could be found which would obviate these drawbacks.

Solution

It happened that Graver Tank & Mfg. Co. had already originated special designs for steel tankage in caustic service which had come to the notice of Jefferson's engineers. This design places all the roof ribs and beams on the outside, yet provides full rain drainage. It utilizes pipe columns for roof supports.

The interior surfaces of the tank are thus smooth and free of projections, and the entire steel surface inside the tank can be readily and lastingly protected by an air-drying, neoprene-base coating. Thus, with this Graver design, the mild-steel tanks can be utilized in corrosive service with as much confidence as tanks of much more expensive alloy materials.

Case 17 — Mississippi

Better Heating Better Work

THE W. G. AVERY Body Company, Inc. of Jackson, Mississippi, manufactures a complete line of finished wood products for the automotive and farm implement industries. Until December, 1958, their shop was heated by conventional space heaters.

Production was lost due to the inadequacy of this system. Many of their machines required two men for operation. When the machine was some distance from the heat source production would stop if either man left his operating spot to warm himself by the heater.

The Palmer Air Conditioning & Heating Company became aware of this situation and suggested the installation of gas fired infra-red PANELBLOC manufactured by Bettcher Manufacturing Corp.

Infra-red radiation travels in a straight line from its source to the objects to be heated, oblivious to its surroundings. It needs no partitions or divisions between heated and unheated spaces.

The Avery Company first consented to a test in a small spot. From this brief test it was demonstrated that the PANELBLOC radiation maintains a comfortable

condition throughout its design area. The output radiation warms people and things, not air. After a brief warm-up period the personnel are sandwiched between the primary radiation of the units and the secondary or re-radiation effect of the floor and machinery.

So conclusive was this trial that the Company installed a total of 7 units to completely heat one division of the plant. So complete is the comfort in this division that men in other sections attempt to get transferred into the area.

The units have no fans or blowers and therefore do not disturb the air in any way. Sawdust can therefore settle out and not contaminate the air.

Mr. W. G. Avery stated that although he does not have actual comparative figures, he knows from observation that the adequate comfort level has increased production.

This entire uninsulated metal building ell is heated with infra-red PANELBLOC. Men, machinery and floors are warmed by the absorption of the long wave length infra-red energy. Note the clearness of the air.

Case 18 — Missouri Plant

Clean-Up

FOR YOUR 1959 Better Production Issue of Southern Power and Industry, I would like to tell of an improvement which we made at our two plants, one located in the Southern territory and the other in the Central territory.

We were suddenly made to realize that the housekeeping in our plants was at an extremely low ebb. We began in our Maintenance Shop and to bring the issue closer home, took "before" and "after" pictures to show what could be done.

With this vivid illustration as a starter, it became easier to clean up other departments, until soon the entire plant was attractive, for now the aisles were clean, straight and marked in many cases with 2" yellow floor tape.

In addition, the raw, fabricated parts were stacked in boxes and pallets in neat order, three high and catalogued, with a card index inventory record kept, showing in an out entries and giving an accurate, perpetual inventory, available at any time.

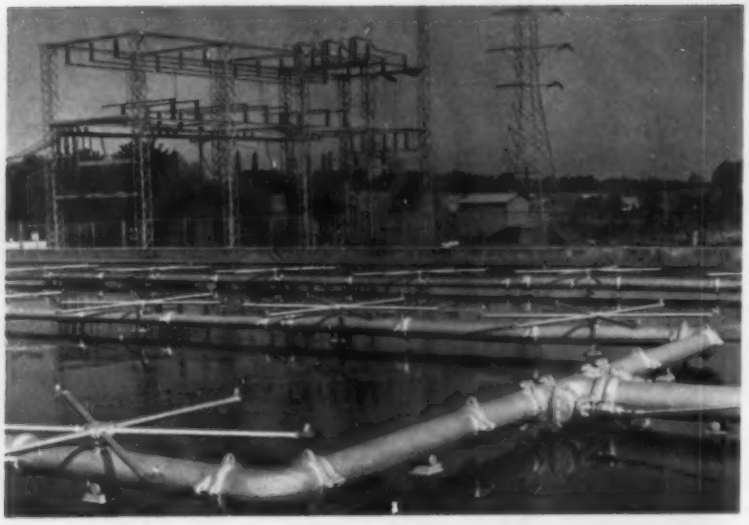
The above has decreased handling expense, improved plant appearance and helped plant morale, as well as furnishing accurate records of quantities of all parts on hand and where located.

By R. V. WILK,
Plant Superintendent,
Day-Brite Lighting, Inc.
St. Louis, Missouri.

Photos show conditions before and after the maintenance department was cleaned up.

Case 19 — South Carolina

Wrought Iron Spray Piping



RECYCLED cooling water saturated with oxygen and other atmospheric gases at the Anderson, S. C., plant of Owens-Corning Fiberglas Corporation, poses a severe corrosion hazard for spray pond piping. To prevent deterioration of these spray pond lines, engineers specified 4-D wrought iron pipe.

Product processing requires use of large quantities of cooling water. Recycled water to the 250,000-gallon spray pond for cooling and re-use reduces water supply costs.

More than 48 tons of 4-D wrought iron pipe — varying in diameter from ¾ to 12 inches — were specified for this installation. Bulk of the 4-D pipe was fabricated for the spray pond while the remainder was used for downspouts, return lines and air conditioning.

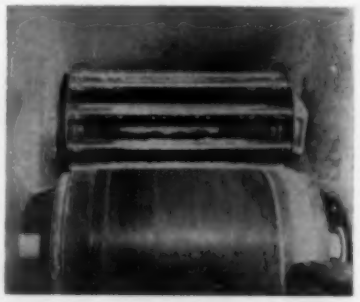
Case 20 — Georgia

Piles for Port Wentworth

WHEN SAVANNAH Electric and Power Company of Savannah, Georgia, built its 55,000 kw Unit No. 1 at the Port Wentworth Station, it worked closely with the Stone and Webster Engineering Corporation, Boston, who designed and built the initial unit (Described in Jan. 1958, SPI). Work has begun on Unit No. 2 at this plant, which is designed for an ultimate capacity of 500,000 kw.

Armco Hel-Cor pile shells provided the foundation for the power station. The pile-driving contractors, Hercules Concrete Pile Company, West New York, N. J., drove 524 shells totaling 20,266 feet in length. These were 12¼ inches in diameter, cast in place with concrete.

The pile shells, shown here in their driven position, were cut-off and filled with concrete. These shells, averaging a driven depth of from 33 to 43 feet, provided the foundation for the power station building.



Case 21 — Alabama

Iron Trapped by Magnetic Grates

STYLON SOUTHERN Corporation, Florence, Ala., has solved the stubborn problem of how to remove fine iron particles and rust from ceramic body as well as coarser pieces of metallic contamination by a combination of permanent non-electric magnetic separators.

This manufacturer of glazed ceramic tile is depending on two different types of grate magnets. One is an Eriez drawer-type double bank grate magnet installed under a belt conveyor which runs beneath a refining unit. The conveyor moves the dry ceramic body to a hopper

Vogt PRODUCTS

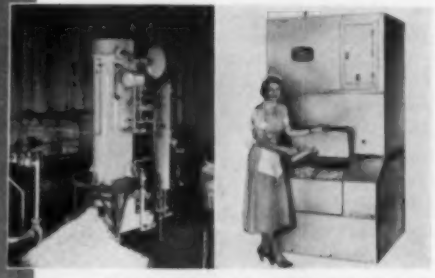
Designed for today's *Tough* service demands

FORGED STEEL VALVES & FITTINGS FOR TOUGHNESS AND TROUBLE-FREE SERVICE

Forged from carbon and alloy steels, Vogt valves, fittings, flanges and unions are built to safely handle liquids and gases at high pressures and temperatures in the modern petroleum refinery and petro-chemical plants. The complete line includes flanged, screwed and socket weld end globe, gate and check valves—ells, tees and crosses—couplings—bushings—plugs—unions—flanges and flange unions—and weld caps.

PROCESS EQUIPMENT FOR EVERY SERVICE

Vogt constructs process equipment in wide variety to all Codes. Stills and towers, oil chillers, crystallizers, heat exchangers, molding machines, etc., serve in the manufacture of oils, greases, 100 octane gasoline, synthetic rubber, chemicals and related products around the world.



MORE REFRIGERATION TONNAGE AT LESS COST

More than 70 years of engineering and manufacturing experience is incorporated in Vogt refrigerating and ice making equipment. Compression Systems and Tube-Ice Machines in a wide range of capacities serve industrial and processing plants and institutions here and abroad.

HIGH EFFICIENCY STEAM GENERATORS

Vogt steam generators are designed to give maximum rating in a minimum of space, with high efficiency and low maintenance expense. Bent tube and straight tube designs are available for solid, liquid or gaseous fuels to meet every power, process or heating requirement.

SPECIAL MATERIALS COMBAT CORROSION AND PRODUCT CONTAMINATION

Our modern shops produce a wide variety of equipment from special metals and alloys to fight corrosion and product discoloration or contamination. Fabrication procedures insure that corrosion resistant properties of welds will match that of the materials used to construct the equipment.

HENRY VOGT MACHINE CO., LOUISVILLE, KY.

SALES OFFICES:
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PRODUCTS FOR REFINERIES, CHEMICAL PLANTS, POWER PLANTS AND PROCESS INDUSTRIES
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which hoists the body to the mixers. The magnetic strength of the Alnico V tubes attracts the larger pieces of metal as the conveyor feeds the material through the grate.

The accompanying photo, looking straight down, shows a Rota-Grate installed below a conveyor carrying the ceramic body to the storage tanks. The Rota-Grate combines positive mechanical agitation with the powerful action of magnetic attraction strong enough to remove even the finest iron particles and rust. Essentially it is composed of two stainless steel circular end plates supporting multiple stainless steel Alnico V tube magnets to form a cylindrical grate.

In Stylon Southern's plant, the grate is mounted on pillow block bearings in a chute conveying ceramic body of 8% moisture to the storage tank. As the flow of material passes down the chute, the Rota-Grate is mechanically rotated through the flow, effectively exposing every part of the flow to the action of magnetic fields. Accumulations of rust and fine iron are moved from the tubes daily.

The Alabama concern reports that very superior quality control and a minimizing of rejects due to iron spotting has resulted from the efficiency of the Eriez Rota-Grate's operation.

Case 22 — Texas Paper Mill

Outdoor Lighting Maintenance Cut

CHAMPION Paper and Fibre Company was faced with a maintenance problem in illuminating the wood storage area in their Pasadena, Texas, plant.

The plant's around-the-clock operations required a wood storage area of a million square feet. And the 24-hour-a-day production schedule called for the very best in lighting — with a minimum of maintenance on lighting installations.

Outdoor area lights, manufactured in nearby Houston by the Wide-Lite Corporation, were installed to satisfy the demanding lighting requirements. Just thirty-two 1000-watt lights were installed to illuminate the 1,000,000-square-foot wood storage area.

This meant that the number of lighting installations was cut by almost two-thirds by replacing the conventional lighting. And costly lamp replacements were reduced by more than 87 per cent.

Outdoor area lights take a severe beating from the elements, particularly if they are in a location similar to Champion Paper's Pasadena plant. This is an area surrounded by chemical and industrial firms, and not far from the salty breezes of the Gulf of Mexico. It was in the direct path of Hurricane "Debra" this year. The units installed in this plant are ruggedly constructed from cast aluminum alloy and finished in aluminum epoxy paint to withstand the effects of corrosion. They are sealed with shock-resistant tempered glass lens, and can be re-lamped without disturbing the seal.

Case 23 — Maryland

Hydraulic Jacks Improved

IN ONE OF OUR press rooms we are using 16 large Filter Presses, each press fitted with a 30 ton hydraulic jack. These jacks were hand operated, at a repair and labor cost of $3,000 annually.

To lower this cost, we installed an electric hydraulic pump system. Hydraulic oil is kept under constant pressure of 5800 psi. This gives us approximately 40,000 pounds pressure on the jack ram. The cut off switch for this pressure system is unique. It is made of an Allen-Bradley limit switch and a pressure gauge from the scrap pile.

The original jacks were used in the new system, after the hand pumps, oil storage cylinder, and counterweights were removed. This cut the weight down from 105 pounds to 40 pounds each.

The advantages gained are:

1. The total cost of parts and maintenance to keep the 16 jacks operating for the past year was $30.00 compared to $3,000.00 the year before.

2. One pressure gauge on the main line replaces the 16 gauges formerly used.

3. Press room morale has improved.

4. Any of the presses on the line can be opened or closed in 10 seconds with no manual work involved.

The principal item of new equipment purchased was a ½ hp Blackhawk hydraulic pump.

By H. J. SCHULTHEIS
Assistant Superintendent
Mineral Pigments Corp.
Muirkirk, Maryland

Atlanta builds for the future

with Armco Steel Pipe water supply lines

Atlanta is preparing now for expected industrial and residential growth by extending water lines in adjacent Fulton County, Georgia. This forward-planning has paid off for Atlanta in the past by attracting new industry with a ready source of water.

Shown above is part of the most recent 1½-mile installation of 30- and 36-inch diameter Armco Steel Pipe along Atlanta's Fairburn Road. This pipe is 5/16-inch wall thickness and was installed in 50-foot lengths. It is part of the more than 150,000 feet of Armco Pipe installed in the Atlanta area over the past five years to expand water facilities.

You too will find that Armco Steel Pipe can solve your water transmission problems. Its high strength, ductility, smooth-as-glass interior linings, and bottle-tight joints mean trouble-free water lines for years and years to come. Write us for more information on Armco Steel Water Pipe. Armco Drainage & Metal Products, Inc., P. O. Box 1343, Atlanta, Georgia, or C & I Life Building, Houston, Texas. Other offices in principal cities.

For this Atlanta water line, lengths of Armco Pipe were joined by Dresser Couplings, with thrust lugs to take longitudinal thrust.

ARMCO DRAINAGE & METAL PRODUCTS

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

Case 24 — Southland Paper Mill, Lufkin, Texas

STATIC CONTROL SYSTEM Regulates Paper Machine Speed

By H. C. MYERS
Installation and Service Engineering Department
General Electric Company
Houston, Texas

NEWSPRINT is rolling off a new 270-inch paper machine designed for a maximum rate of 2,500 feet per minute at Southland Paper Mills, Inc., Lufkin, Texas.

Chief electrical feature of the Pusey & Jones machine is a General Electric sectional drive employing a transistorized static speed-regulating system — the first ever applied in the paper industry. One current-regulated and six speed-regulated sections comprise the new drive.

After nine months of operating experience, Southland Paper has found that the electrical system for its new No. 4 machine provides high speed regulation over a speed range of 1000 to 2500 fpm, with minimum drive maintenance required. Electrical downtime also is held to a minimum. Production losses caused by the drive have been only three hours.

The static regulating system uses transistors and magnetic amplifiers to control the section speed. The use of these long-life static components has proved most satisfactory during the initial months of operation.

The General Electric sectional drive consists of a Fourdrinier section with speed-regulated wire-drive and a current-regulated suction-couch drive, felt section, second press, dryer, calender, and reel section.

Total connected load of the General Electric drive is 3100 horsepower. This includes 15 d-c motors powered from eight generators ranging from 100 to 500 kilowatts. The generators are arranged in two motor-generator sets, each driven by a 1500-horsepower synchronous motor.

Control of paper machines is still in the process of a long evolution which started with a primitive system of a line shaft fitted with cone pulleys and belt-shifting means. As paper machine speeds were increased and quality demands became more stringent, better means of controlling and driving paper machines were developed. This transistorized drive is by no means the end of this evolutionary process but it appears to be the most advanced technology yet developed.

The previous design of regulating system using electronic preamplifier and amplidyne power amplifier was good but had certain inherent maintenance problems. The electronic tubes had a limited life and thus required tube replacement. The rotating amplifiers were relatively troublefree but, in common with all rotating d-c machines, had commutators and brushes and their attendant maintenance problems.

Maintenance is, of course, an especially critical problem in areas of high contamination such as frequently found in paper mills. The substitution of transistorized preamplifiers for vacuum tube preamplifiers and the use of static power amplifiers can be expected to drastically reduce maintenance.

A point for careful consideration in transistor application is that transistors are considerably more prone to damage caused as a consequence of some other component in the circuit associated with them failing than are tubes. This has been precluded in the design of the equipment for Southland by careful selection of circuits which minimize this possibility and by selection of all components with large safety factors. That this approach is successful has been demonstrated by the troublefree operation of this drive.

The substitution of power Amplistats for Amplidynes has eliminated the commutator and brush problems without introducing the disadvantages of thyratrons. The Amplistats are 400-cycle units which reduce size and weight, while the rectifiers used in the Amplistats are silicon units which are the most efficient type available for this application.

Downtime chargeable to this drive has been greatly reduced over the previous types and overall machine production has been significantly improved as a result.

Case 25 — Alabama Plastics Molder

Remote Control Regulator Aids Birmingham Plant

FOR $300 and a little plumbing know-how, a Birmingham, Alabama, plastics molder has devised a remote-control regulating apparatus that holds temperatures to within plus or minus 1½ F on an injection molder working as fast as 20 cycles per minute.

The molding machine is used by Plastone Plastics Co., Inc., to make a variety of polystyrene items, ranging from salad bowls to drug boxes.

Instead of mounting temperature regulators and valves directly on the die sections to be controlled,

You get these benefits when you install YARWAY GUN-PAKT EXPANSION JOINTS

Why do industrial plants, institutions, universities and central heating plants SPECIFY and INSTALL Yarway Gun-Pakt Expansion Joints?

Because with Yarway you get:

- **CONTINUOUS SERVICE**
  Costly shutdowns are eliminated. Packing is seldom necessary but may be added *under full line pressure.* No vents are necessary. Never needs repacking.
- **RUGGED DEPENDABILITY ALL STEEL CONSTRUCTION**
  Durable chromium plated seamless steel sleeves. No chance *of metal fatigue.* Wrought steel bases provide rugged, positive anchorage.
- **INTERNAL AND EXTERNAL GUIDES**
  Positive alignment of sleeve in stuffing box *—where it counts!*
- **LIGHT WEIGHT, STREAMLINED DESIGN**
  Requires less space to install—less space to maintain—smaller manholes.

Many Gun-Pakt joints have been *in service over 25 years with only nominal maintenance*—no major repairs or periodic overhauls. Maintenance costs are negligible—records show average to be one manhour and 65 cents worth of packing per joint per year. AND—NEVER A SHUTDOWN FOR REPACKING!

YARWAY field engineers are qualified to advise on installation and service—at no cost to you. Investigate today. Write for Bulletin EJ 1917 ('59).

FOR YOUR NEXT PIPELINE JOB—BE SAFE—BE SURE! SPECIFY YARWAY GUN-PAKT.

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Home Office: 116 Mermaid Ave., Phila. 18, Pa.
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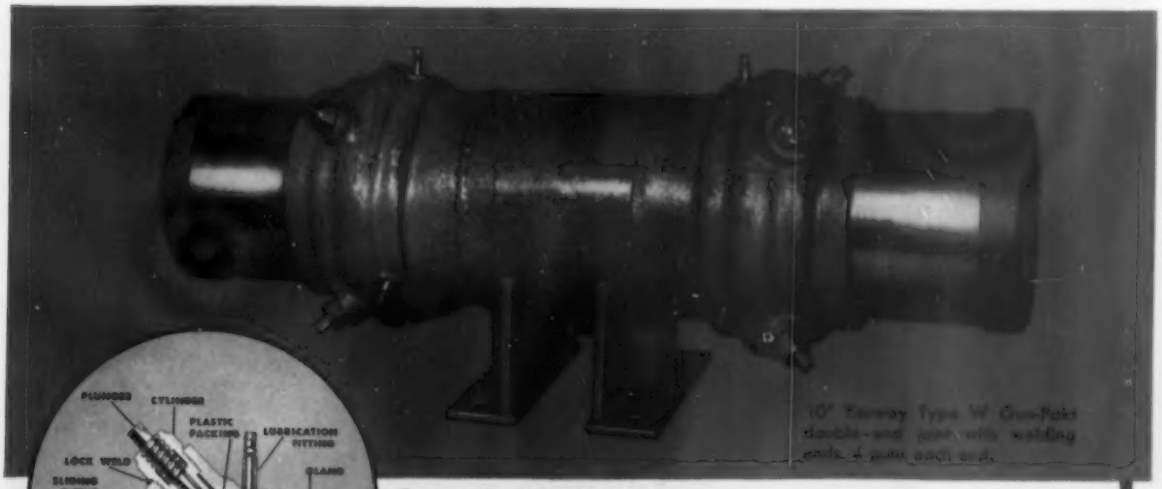
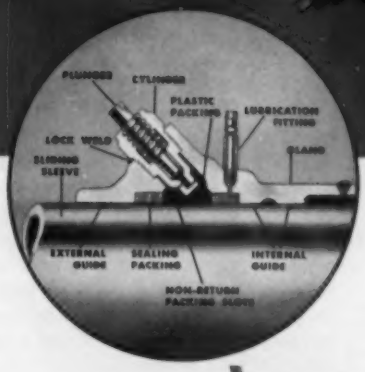
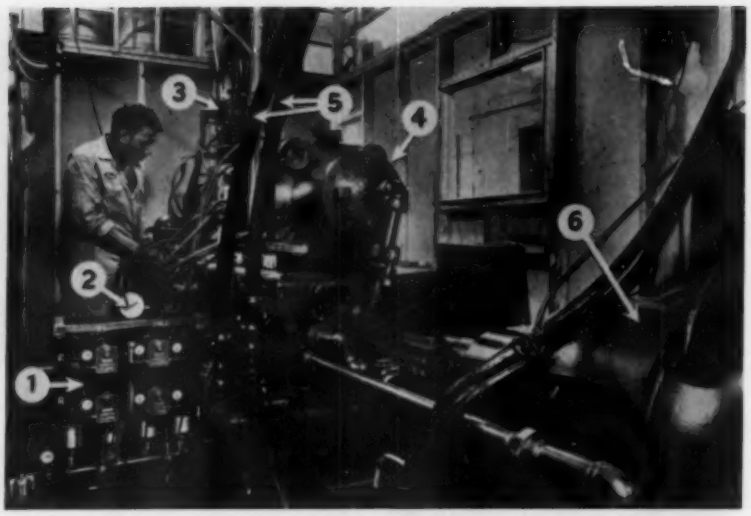




Cross-section of Gun-Pakt feature. To add packing, just insert a plug and turn the plunger. Note non-return packing slots.

YARWAY GUN-PAKT



View of injection molder at Plastone Plastics Co., Inc., shows temperature control rack (1) equipped with four Accritem regulators. Other equipment includes (2) dial thermometer indicating water temperature coming to molds; (3) preplasticizer; (4) hydraulic clamping cylinder; (5) hoses supplying water to cool hydraulic oil; and (6) 30 hp motor driving oil pump.

Plastone mounts this equipment on a separate steel rack and makes the connections to the die halves with flexible vinyl hose.

According to Don E. Hume, Plastone engineer, the problem was one of devising a temperature control system that would meet the space requirements of the molding machine, and could also withstand the constant shock of rapid injection molding.

The machine and pre-plasticizer operate in a horizontal plane. Polystyrene at 385 F is pushed by double rams into the closed mold which compresses it at pressure up to 28,000 psi. The mold opens and the molded plastic is ejected.

Depending on the item being molded, a cycle takes from two to six seconds. In some cases one-half of the mold die is kept at 220 F while the other half stays at 45 F.

Because of the compactness of the machine and pre-plasticizer, and because of the rapid back-and-forth action of the moving half of the mold, it was impossible to mount temperature controls directly on the molding apparatus.

A discussion of the problem with W. C. Heckeroth, engineer for the Powers Regulator Company, suggested the idea of linking the controls to the mold halves with vinyl hose, and mounting the controls on a rack away from the machine.

Regulators, valves, and steel pipe to construct the rack cost $300. Mounted on the rack are four Powers Accritem regulators and four ⅛-inch pneumatically-operated Powers unit conditioner valves controlling the flow of water used to cool the mold halves.

Pneumatic equipment was chosen because molded part ejection is air-operated, and the air supply is convenient. Water at 42 to 45 F is piped into the mold halves to carry off the heat generated by the molding process. The water is provided by a 10-ton chilling unit, and is recirculated under 30 lb pressure.

The temperature-controlling Accritem regulators are mounted in pairs, two for each mold half. The mold halves themselves are in two parts, each with independent temperature control for accuracy.

A 4-foot length of vinyl hose leads from the mold half to each regulator. The temperature-sensitive bulb of the regulator is directly within the hose, and is constantly exposed to the changing temperature of the water flowing from the mold through the hose.

As heat builds up in the mold, the water becomes warmer, causing a pressure change in the regulator bulb. This change is pneumatically transmitted to the diaphragm-operated valve on the water supply hose, causing the valve to open gradually and admit more cold water to the mold. As temperature returns to the desired point, the valve closes gradually, restricting flow of cold water.

Case 26 — Ala. Stamping Plant

Monday Morning Air Troubles Ended

AN ALABAMA stamping plant experienced plant equipment shutdowns due to water forming in air lines, particularly following week-end shutdowns when outside air temperature was low. Although the air system was equipped with an aftercooler as well as a purifier, water vapors condensed out in the lines beyond the aftercooler due to low surrounding temperatures. This would cause the moisture to foul the automatically operated air control equipment.

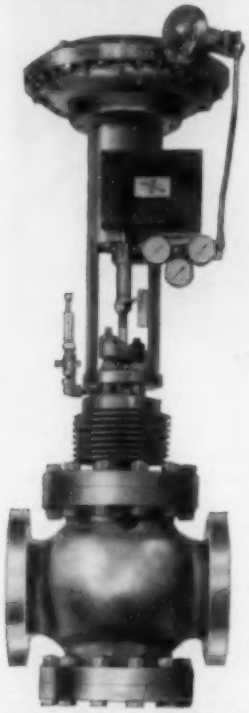
To remove the moisture, V. D. Anderson LC Purifiers and Drainers individually and accurately sized for each application were installed immediately ahead of the air powered stamping presses and other air controlled equipment.

After fifteen months of service, the stamping company reports no shutdowns or downtime due to moisture fouling equipment. Engineers who solved this problem, point out that although intercoolers and aftercoolers, as well as purifiers, are used in an air system it is advisable to install small, line purifiers at the point of usage to remove condensate which condenses out in the air lines after leaving the aftercooler.

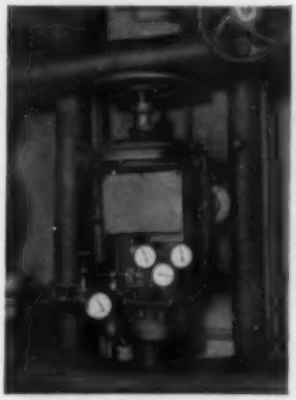
COPES VULCAN

BLAW-KNOX

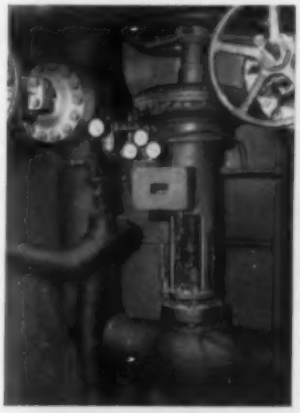
How Copes-Vulcan control systems boost power plant efficiency



Type CV-D (diaphragm-operated) valve serves a broad variety of applications in sizes up to 12 inch. Optional features include: cooling fins and stuffing-box lubricator to maintain low friction over long packing life, auto-lock, top or side-mounted handwheel for emergency operation.



Valves used in modern combustion control system. One diaphragm-operated valve is used as a single-seated fuel return control valve (left) while another controls the speed of the turbine driving the forced-draft fan (right).



Efficient feedwater-flow control system uses a Type CV-D valve equipped with positioner, air lock, and emergency handwheel operator (left). Another diaphragm-operated valve trips automatically if fuel-oil line pressure drops below a safe limit (right).

Copes-Vulcan Regulator Valves bring precision control to exacting jobs...

Designed for superior accuracy and long range dependability, Copes-Vulcan valves establish new standards of efficiency for pressure, temperature, flow, and level control.

To assure trouble-free performance, Copes-Vulcan custom designs each valve to suit your most rigid control requirements. The kind of fluid—its flow, pressure, and temperature—are all studied before a recommendation is made. Port area and style are selected on the basis of careful research.

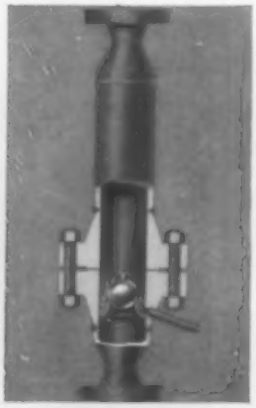
The Copes-Vulcan line includes the following valves.

Diaphragm valves (Type CV-D) provide greater versatility . . . have excellent rangeability . . . may be direct or reverse acting.

Piston-type valves (Type CV-P) offer simplicity of design . . . ideal where valve-operating force must be unusually high, where positioning must be precise.

Nuclear valves for ships, atomic plants, and test reactors. Supplying valves for these advanced projects offers proof of the acceptance of Copes-Vulcan's skill and integrity.

Pneumatic control stations assure combustion control efficiency. Copes-Vulcan stations offer simple automatic-to-manual selection without complication of seal balance. Transfer is "bumpless" without process disturbance. Write for Bulletin 1031.



Desuperheater improves temperature control. New Copes-Vulcan Variable-Orifice Desuperheater holds reduced steam temperature constant less than twenty feet downstream from desuperheater outlet, even over a 50-1 load range. Write for Bulletin 1037.

Copes-Vulcan Division
BLAW-KNOX COMPANY
Erie 4, Pennsylvania

Case 27 — North Carolina

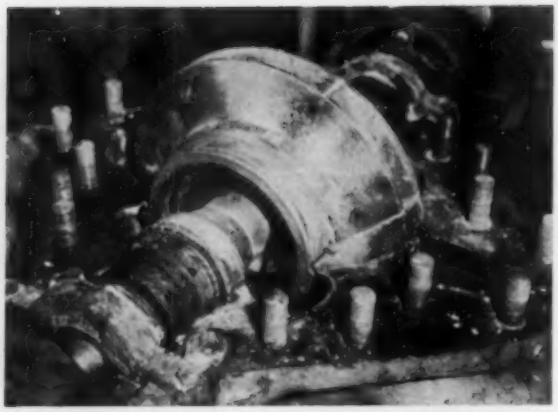
Stainless Steel Sea Water Pump Free from Corrosion

HIGH SPEED pumps for handling sea water often suffer efficiency reducing corrosion of the moving parts, requiring frequent and costly maintenance shut-downs. Corrosion problems of this nature have been reduced to a minimum through the use of highly corrosion resistant materials for pump casings and impellers.

Among the more successful materials used in this application have been cast Monel nickel-copper alloy, Ni-Resist cast irons, bronzes (particularly nickel-aluminum bronzes) and stainless steels.

A good example of the latter material is a stainless steel centrifugal pump which has been pumping sea water for more than 25,000 hours at the Marine Corrosion Testing Station of the International Nickel Co. Inc. at Harbor Island, N. C.

Both the casing and impeller of the 600 gallon per minute pump which operates at 600 rpm were made from a special corrosion resisting stainless steel containing 18-20% Cr, 22-25% Ni, 2.5-3% Mo, 2.4% Si,



2.3% Cu, 0.4-1.7% Mn, 0.08% C and 48% Fe.

There has been no apparent reduction in the efficiency of this pump and only a minimum of maintenance has been required during its operation as it continues to furnish an uninterrupted supply of sea water for the many tests being conducted at the laboratory.

By D. B. ANDERSON,
Kure Beach Testing Station,
Wrightsville Beach, N. C.

Case 28 — South Carolina Paper Mill

What Became of Big Joe Blow?

SHE'S ONLY five foot two, but she "operates" these six big filters at the Charleston, S. C. plant of West Virginia Pulp & Paper Company.

If these were standard manually-operated gravity filters, it would take a husky well-trained man on each shift to open and close heavy valves for shutoff, backwash and rinse. If they were table-controlled automatic filters, the initial cost would be almost doubled.

These Permutit Valveless Filters shut themselves off from service at just the right bed condition. They backwash and rinse at the most efficient flow rates and for a pre-set length of time. Then they put themselves back into service. They use a simple design employing basic hydraulic principles for control and operation.

Case 29 — North Carolina

Roof Spray System Cuts Air Conditioning Load

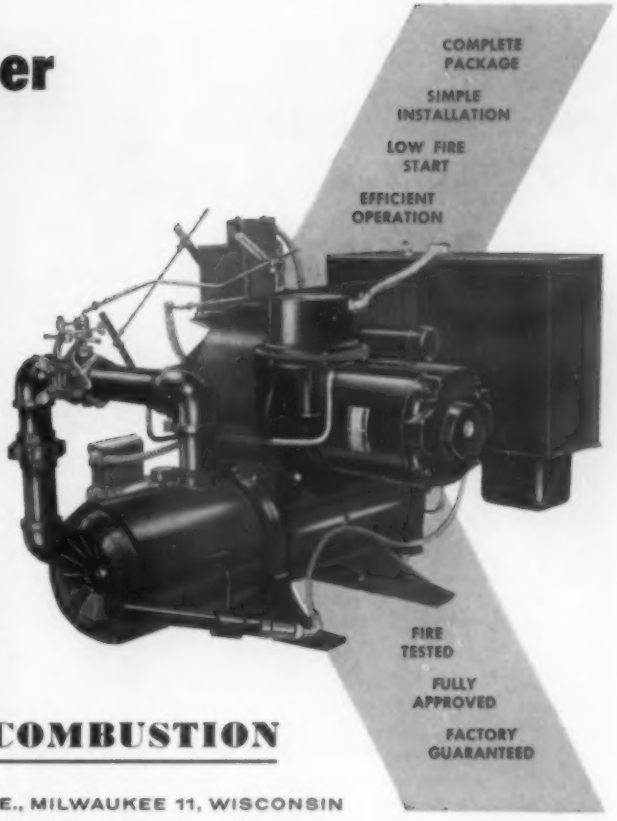
RECENTLY a visitor at Belmont Throwing Corp., Belmont, N. C., was in the machine room inspecting the newly installed air conditioning equipment. He asked why the necessity of continuing the use of their April Showers automatic roof spray system installed in 1957.

L. R. Robinson, Maintenance Engineer, puts it this way; in the first place, the entire roof heat load is completely dissipated, relieving the compressor of that much additional work. By actual check compressor motor draws from 105 to 110 amps with sprays operating. When sprays are shut off the compressor motor draws over 130 amps. Also expansion and contraction of roofing materials is completely stopped, thereby prolonging its life.

Low cost gas burner outstandingly efficient at all flame settings

Precision-engineered commercial-industrial Hev-E-Duty power gas burners are the low-cost answer to high heating efficiency with gas. Automatic electric ignition assures safe starting. Built-in low fire start that builds up slowly to the flame size required means smooth, safe operation. Minimum low fire and maximum high fire can be controlled exactly for top efficiency with any boiler or furnace.

Once set, the burner maintains this setting automatically regardless of weather. Sizes from 720,000 to 21,000,000 BTU. Hev-E-Oil and combination gas/oil models also available. For more information write Industrial Combustion, Inc., 4507 N. Oakland Ave., Milwaukee 11, Wis., Dept. SPI-1059.



INDUSTRIAL COMBUSTION INC.

EXECUTIVE OFFICE: 4507 N. OAKLAND AVE., MILWAUKEE 11, WISCONSIN

LOOK FOR QUALITY

in your hot water generator... look to FINNIGAN

Finnigan Hot Water Generators are engineered to give you large quantities of hot water for low operating cost. The finest materials, creative skill and quality construction assure efficiency in Finnigan equipment. These generators are fabricated from corrosive-resistant materials and contain copper removable-coil heating elements. Before leaving the plant, each generator must conform to ASME, API, U. S. Government and other specifications. "Fabricated by Finnigan" is your assurance of quality.

Finnigan builds hot water generators to your specifications. Call, wire or write today for complete information with no obligation to you.

TANKS, SMOKESTACKS, PIPING, WATER HEATERS, BREECHING, PLATE WORK.

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Kansas City 41, Mo., 1720 Harrison St.
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Jacksonville 4, Florida, P. O. Box 2527
Little Rock, Arkansas, 4108 C. Street
New Orleans 25, La., 4054 Thalia Ave.
New York 17, New York, 41 E. 42nd St.

Case 30 — Foley, Florida

Load Center Substations at Buckeye Cellulose Plant

NEW FACILITIES at Buckeye Cellulose Co.'s Foley (Fla.) plant include the cost-saving advantages of Allis-Chalmers load center feeder protection. Motors supplying the power to the production equipment at Buckeye require only simple starters, thanks to the load center substation concept employed there.

A total of 12 substations, similar to the unit pictured, channel power to production equipment drive motors. These subs limit short circuit current by utilizing high impedance transformers.

Ten of the Allis-Chalmers load center substations are rated 1000 kva and two are rated 750 kva. There are also three outdoor multi-circuit substations — two are rated 1000 kva and the third, 1500 kva.

The current at the feeder breaker terminals is limited to 25,000 amperes, and as a result, the standard motor control center is used. Hence, the individual motor starters provide complete protection for the motors, while being coordinated with a selective trip device on the main feeder line breaker to prevent isolation of the entire control center due to a fault on one motor.

Otherwise a special motor control center would have to be applied to withstand the possible fault current, or a costly reactor used to limit fault current.

Case 31 — Texas Chemical Plant

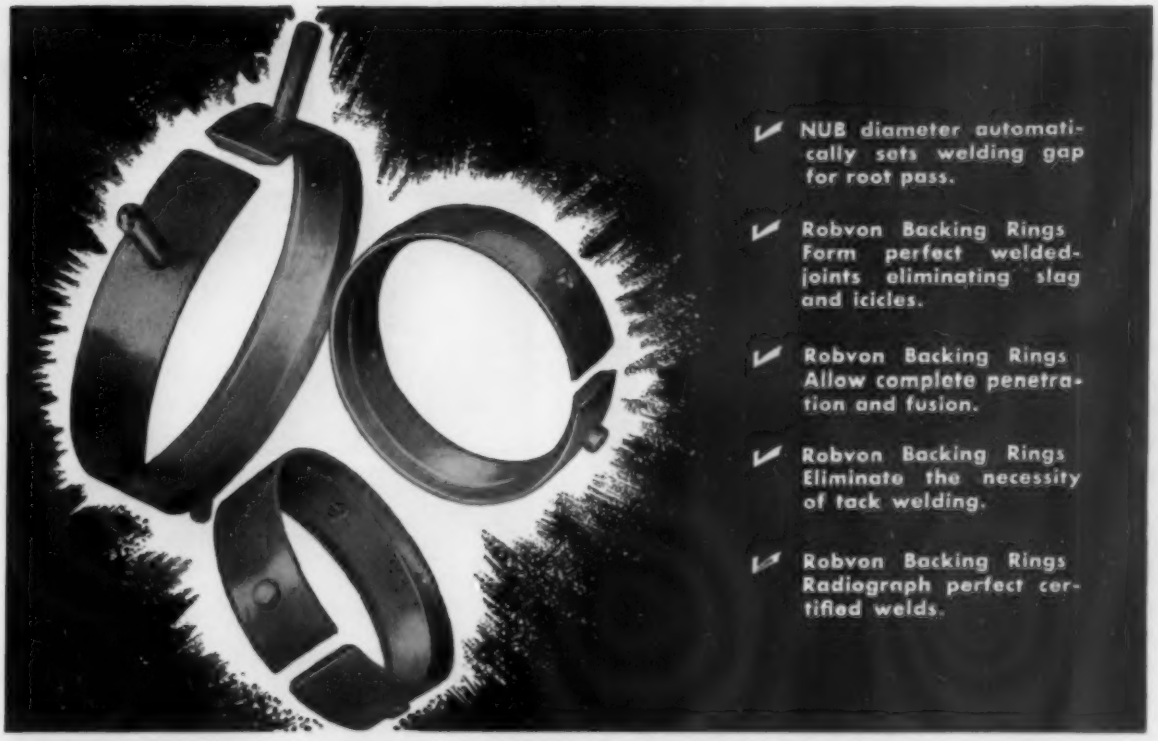
Heat Transfer Problem Solved

AN INEXPENSIVE external copper tubing system covered with Thermon Heat Transfer Cement solved the problem of heating a Diethanolamine storage tank for Ranger Chemical Company, Houston, Texas. The Thermonized system cost about fifty per cent less than a comparable internal stainless steel tubing system.

To avoid the danger of possible contamination, Mr. George B. Kimbro, Industrial Supervisor at Ranger Chemical, decided against a more expensive internal system. Instead, he used an electrically operated, commercial hot water heater to feed 250 feet of ½-inch OD copper tubing attached to outside of tank. The tubing was covered with Thermon Heat Transfer Cement, and the tank insulated with 3-inch fiberglass, maintaining tank temperature at 95 F. Water flow at the design ambient temperature of 30 F is less than 1 gpm.

Using this Thermonized system, Ranger has had more than a year of trouble-free service — with no possibility of contamination. This type of installation is highly adaptable for any company which stores and handles chemicals which become viscous at normal room temperature.

Diethanolamine storage tank after more than a year of service, showing Thermonized tubing "A" with 3-inch fiberglass insulation.


NUB diameter automatically sets welding gap for root pass.
Robvon Backing Rings Form perfect welded-joints eliminating slag and icicles.
Robvon Backing Rings Allow complete penetration and fusion.
Robvon Backing Rings Eliminate the necessity of tack welding.
Robvon Backing Rings Radiograph perfect certified welds.

ROBVON BACKING RINGS

APPROVED FOR WELDED PIPE, VALVES, AND FITTING JOINTS

Available in carbon steel, wrought iron, chrome alloys stainless steel, aluminum and copper

TYPE CCC Designed for quick easy alignment of pipe where the variation in inside diameters is relatively great. Chamfered NUBS allow close tolerance fit-up and CLEAN STRIKE OFF. The ROBVON NUB automatically sets root gap. ROBVON rings are beveled to assure non-restricted fluid flow.

TYPE CC Designed to allow quick easy alignment of pipe where the inside diameters are slightly out of round. The welder has the choice of "STRIKING OFF" the NUBS or leaving them intact to be melted into the weld mass of the first root pass.

TYPE C Designed for precise close tolerance fit-up. Type "C" NUBS automatically sets root gap. The NUBS melt with the metal to give complete penetration and fusion.

Robvon also manufactures machined rings to customer's specifications
All fabricated solid machined rings x-rayed. Write for full information

ROBVON
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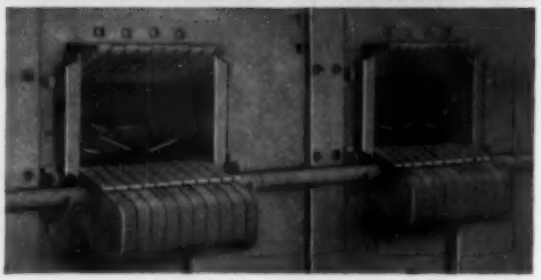
675 GARDEN STREET ELIZABETH, NEW JERSEY

For Fuel Firing Versatility ...Low Cost Maintenance ...High Operating Efficiency

INSTALL

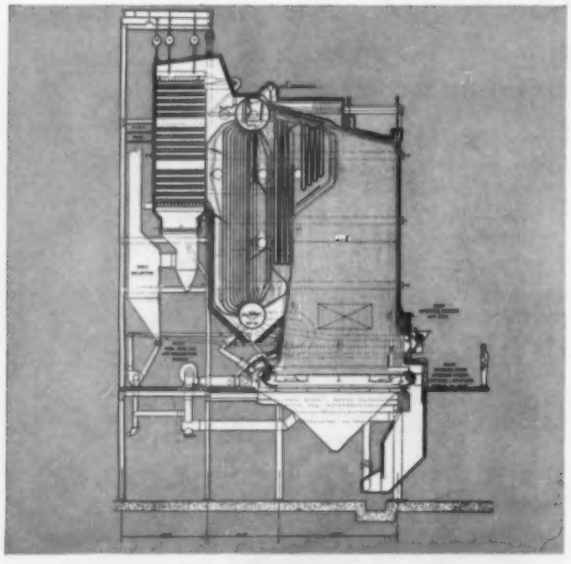
Riley Traveling Grate Spreader Stokers efficiently burn coals having a wide range of coking, caking, and ash fusion characteristics. High working efficiencies are produced with low grade fuels such a sub-bituminous coals, lignite, wood refuse, bagasse, and other cellulose materials.

B. F. Goodrich, Champion Paper and Fibre Co., E. I. Dupont de Nemours, General Electric, Montana-Dakota Utilities, Gaylord Container, Utah-Idaho Sugar, Kennecott Copper, Swift & Co., Bendix Aviation, Armstrong Cork are but a few of many prominent companies that are using Riley Spreader Stokers under Riley Boilers. Such performance-proven installations as these substantiate the superior operating characteristics of Riley Spreader Stokers: uniformity of feed and distribution . . . complete, continuous combustion . . . low carbon loss . . . high day-to-day overall efficiency . . . long-term, low-cost maintenance.



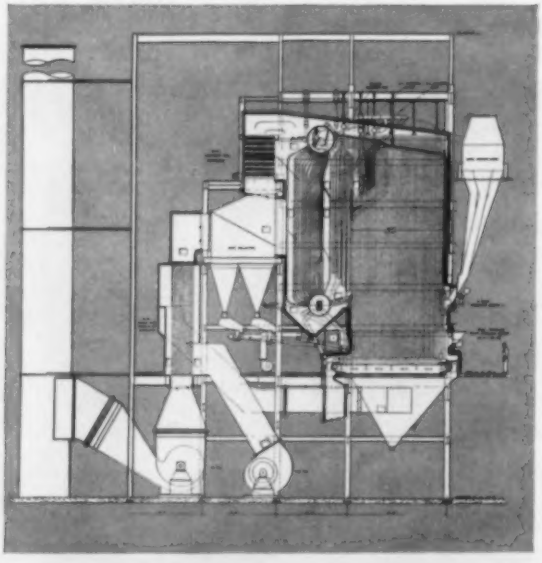
Two Feeder Models

Riley Spreader Stoker Model 'B' Feeders are supplied for capacities up to 200,000 lbs/hr; Model 'D' Feeders for boiler capacities over 200,000 lbs/hr have feeder drum in coal hopper which meters coal regardless of moisture. Adjustable distributor blades give uniform coal distribution.



In Combination With Natural Gas Firing
Deere & Company, Moline, Ill.

20' x 16' Riley Traveling Grate Stokers equipped with Riley Model 'B' Feeders fire two complete Riley Steam Generating Units with pressurized furnaces. Riley Intertube Gas Burners fire natural gas as an auxiliary fuel. Capacity 135,000 lbs/hr, 750F, 650 psig. Efficiency 84.8%.



Simultaneous Bark and Coal Firing
Marathon Southern Corp., Naheola, Alabama

A 26' x 22' Riley Traveling Grate Spreader Stoker, fed by Riley Model 'D' heavy-duty Coal Feeders and Riley Pneumatic Bark Distributors, fires this 300,000 lb/hr Riley Steam Generating Unit with an efficiency of 85%. 875 psig, 825F.

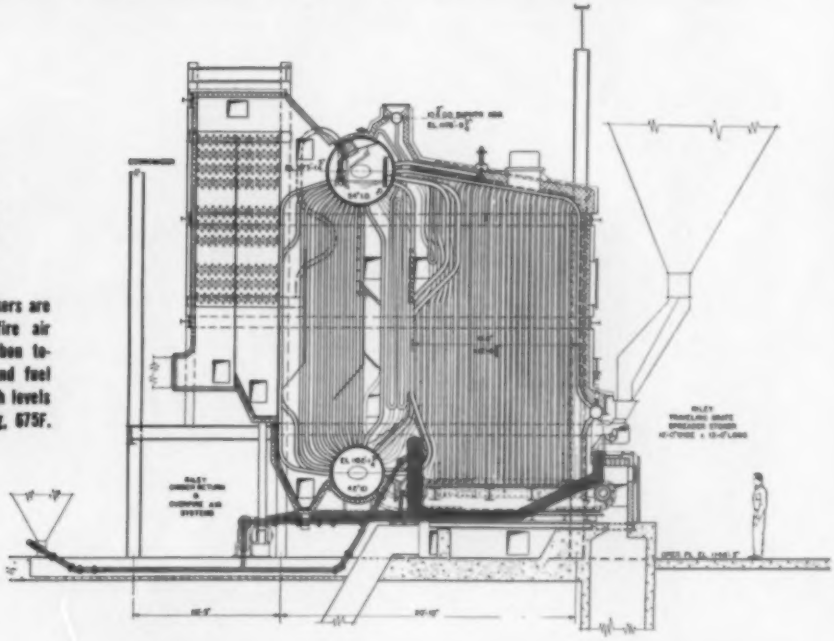
RILEY SPREADER STOKERS

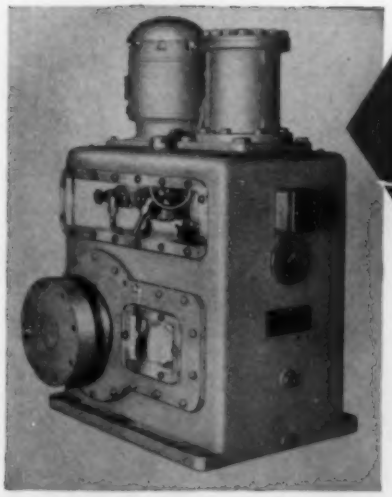
With Either Traveling, Oscillating, Dumping or Stationary Grates

Cinder Return And Overfire Air System

Pennsylvania Railroad, Juniata Shops, Altoona, Pa.

Many Riley Traveling Grate Spreader Stokers are equipped with cinder return and overfire air systems. High recovery of unburned carbon together with intimate blending of air and fuel assures a wide range of operation at high levels of efficiency, 3 — 60,000 lb/hr, 600 psig, 675F.





Smooth, Continuous Operating Hydraulic Drive for Traveling Grates

The self-lubricated Riley Hydraulic Traveling Grate Drive power unit operates quietly and smoothly with uninterrupted continuous automatic or manual speed control from stop to full load. The design does away with sprockets, chains or gears. A pressure gauge describes load conditions at all times.

High Efficiency Grate Surface

Providing high efficiency with low maintenance requirements, the surface of the Riley Traveling Grate Spreader Stoker has small (2" x 6") overlapping grate clips, of special heat-resisting alloy. Nose-over-tail design forces clips to separate when starting return travel, freeing themselves of ashes and clinkers. Tuyeres in the center and at sides of clips give uniform air distribution.

A careful survey of your plant by a qualified consulting engineer could show ways of making substantial savings in power costs.

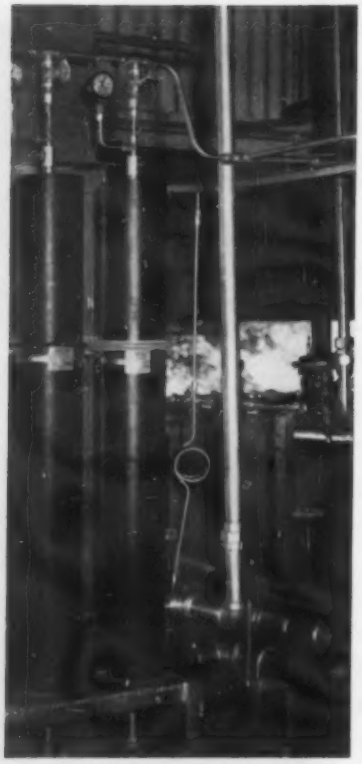
RILEY

STEAM GENERATING & FUEL BURNING EQUIPMENT

Call a Riley Sales Engineer for experienced technical advice covering your requirements for both boiler and fuel burning equipment.

RILEY STOKER CORPORATION, WORCESTER, MASSACHUSETTS

SALES OFFICES: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Jacksonville, Kansas City, Los Angeles, Milwaukee, New Orleans, New York, Philadelphia, Pittsburgh, Portland, St. Louis, St. Paul, Salt Lake City, San Francisco, Seattle, Syracuse, Worcester.



Parker piston type hydraulic accumulators installed in the rubber molding press system in the plant of Berea Rubber Company, Berea, Kentucky.

Case 32 — Kentucky

Hydraulic Accumulators Bring Lower Cost

HYDRAULIC accumulators are being used in the plant of Berea Rubber Company, Berea, Kentucky to help achieve lower capital investment and lower production cost.

With the help of these piston type accumulators, one hydraulic pump serves a long line of presses which mold synthetic rubber O-rings for sealing applications. Without accumulators, even a pump several times larger, with larger diameter lines, could not maintain the steady pressure required.

Without accumulators, only a separate pump at each press, at much greater total cost, could avoid the pressure fluctuations on closed presses when other presses were opened or closed. Furthermore, each individual pump would have to be large. Avoiding the power consumption of larger pumps, or of individual pumps, keeps production costs down.

Maintenance of individual pumps would be far more costly in parts and man-hours than required on this central fluid power supply arrangement. Thus, further savings in production costs are realized.

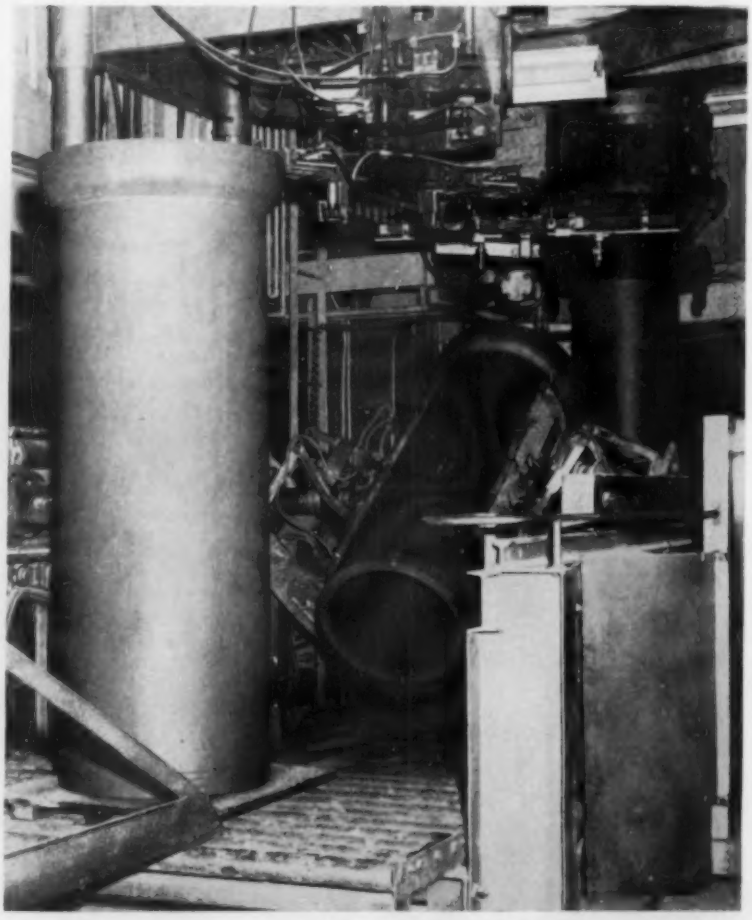
This press system uses a 5 per cent solution of soluble oil in water with standard accumulators made by Parker Hydraulics Division, Parker-Hannifin Corporation.

The two accumulators in the picture, plus two not shown, together with the pump, maintain pressure to each press between 2,850 psi and 2,950 psi.

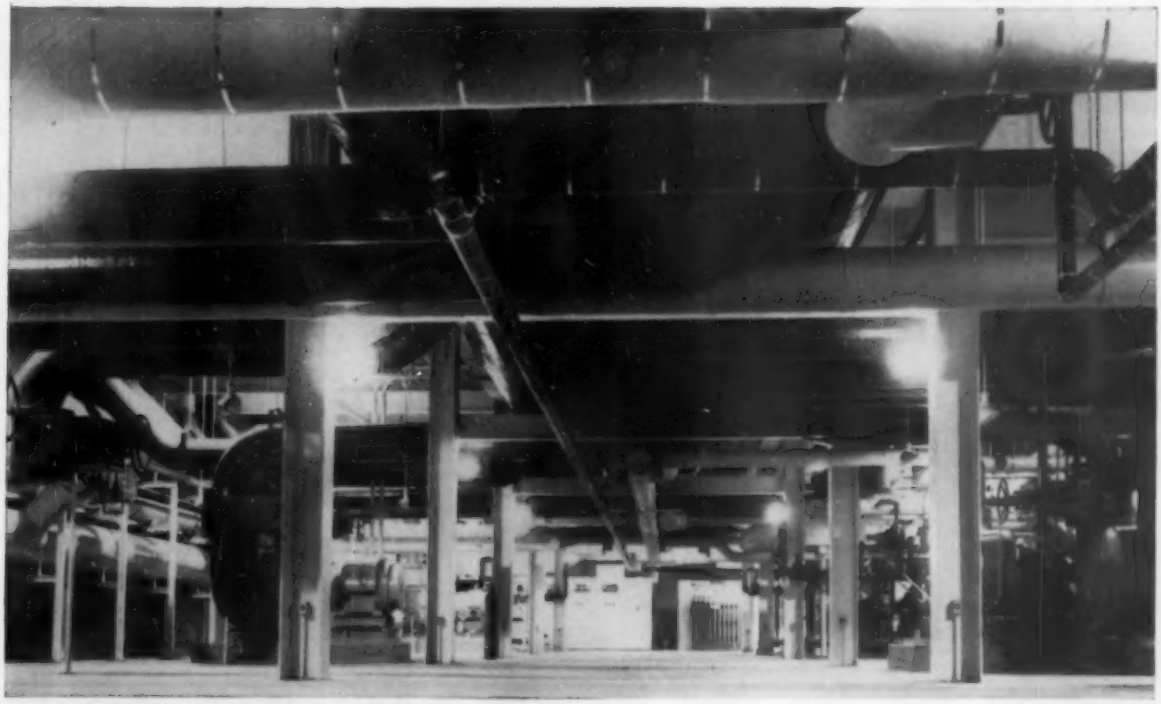
Case 33 — Texas Pipe Plant

Automatic Processing

AN EXAMPLE of the modern quality-control methods in use today at the Texas Vitrified Pipe Company, Mineral Wells, Texas, is this vertical hydraulically-operated clay pipe press with automatic octopus which finishes both spigot and socket ends, and delivers the pipe on a pallet board to the truck pickup position. Seven different sizes of clay pipe (15" through 36" diameters, five feet long), can be produced on this equipment.



The face of a commercial center



Architects and Engineers: Lane, Gamble and Associates; General Contractors: Robert E. McKee, Inc., and J. E. Morgan and Sons; Heating and Plumbing Contractors: Kiefler Plumbing and Heating Co., and Sam P. Wallace and Co.; Mechanical Engineers: Blum and Guerrero, and William K. Hall and Co.

. . . and its heart

THIS IS EXCHANGE PARK IN DALLAS, TEXAS—a 125-million dollar commercial development of five multi-story office buildings, a regional shopping center, a hotel and a complete medical center.

Over 300 tons of USS National Seamless Pipe in sizes from 2⅜" through 24" were used in the heating and cooling system which serves the center from a utility plant. Steam at 250 psi working pressure is generated in the utility plant by five 50,000-pound boilers whose combined steam capacity is 250,000 pounds. This plant also has a refrigeration capacity of 12,000 tons, supplied by a system capable of handling close to 34,000 gallons of condenser water per minute, and is capable of meeting the needs of a city with 36,000 people.

Do you need quality pipe for power, heating and air-conditioning installations? You'll get it when you ask for "NATIONAL PIPE." If you'd like further information or immediate assistance with your pipe problems, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

"The world's largest and most experienced manufacturer of tubular products"

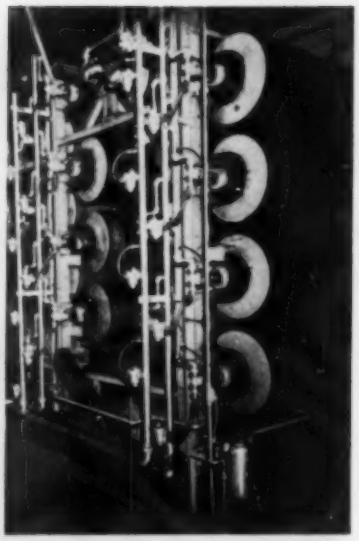
Case 34 — N. C. Textile Mill

Lubrication System Cuts Maintenance

GREASE DRIPPAGE from the 68 bearings on the steam-heated cans of a cylinder drying machine at Erwin Mills' Finishing Plant in Cooleemee, North Carolina, caused a time-consuming and often repeated housekeeping job. To remedy this costly situation, the Plant Manager — aided by L. W. Kinnear Co. in Charlotte — installed an automatic, air-borne Norgren Micro-Fog Lubrication System.

After months of careful observation the Norgren System proved to eliminate the drippage and clean-up jobs, as well as end the manual lubrication of the 68 bearings and the periodic bearing cleaning which was also necessary in the past.

In addition, Erwin Mills gained other advantages: bearing lubrication was improved and bearings showed little signs of wear; bearing temperatures were reduced; bearing failures stopped; uneven drag on bearings, due to over- and under-lubrication, which caused faulty cylinder operation, was eliminated; savings in lubricant costs were effected.



Case 35 — Georgia Power

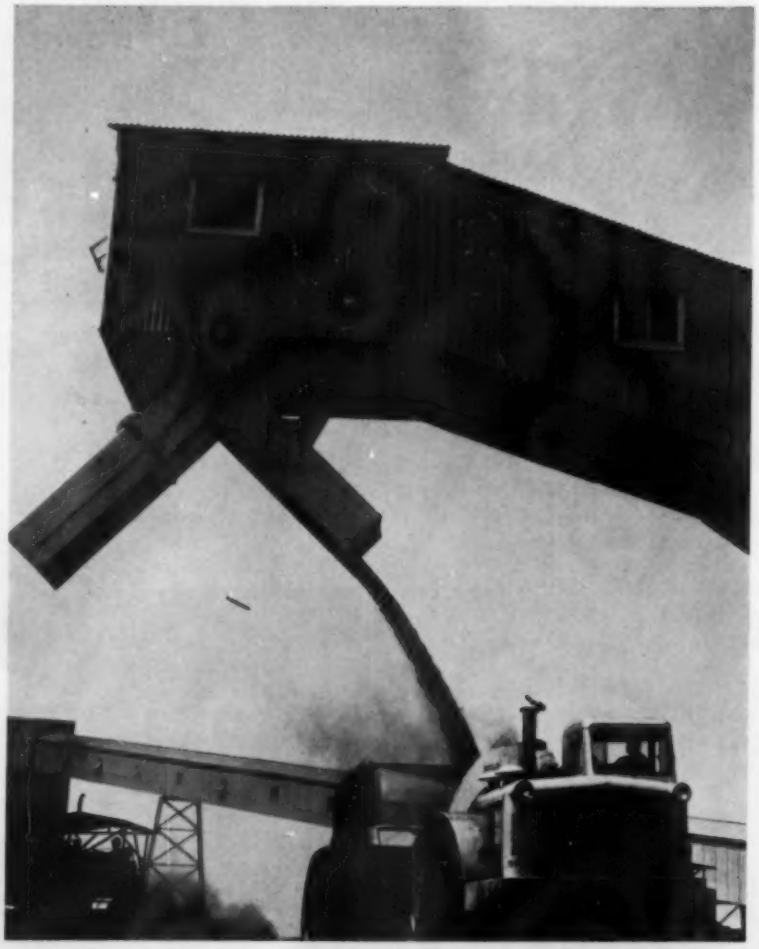
Radio Signal Switch

GEORGIA POWER Company uses a short wave radio transmitter and receiver to speed up coal handling at Plant Yates near Newnan, Georgia. The stocking-out coal chute has two discharge spouts. A flop gate operated by a 7" x 10" pneumatic operator directs the coal to one of the two spouts. A three-way solenoid valve pilots the pneumatic operator and this solenoid is actuated by a Perma-Power radio control system.

A transmitter is mounted on each tractor and the tractor operator pushes a button on the dash to direct coal into his pan from the proper discharge spout. When a pan is loaded the radio push-button is depressed and coal flows through the other discharge spout into another pan which is parked in position. While one pan is distributing its coal on the pile another pan is being loaded so there is no time wasted.

The radio control system operates on an assigned frequency of 27.255 megacycles on a tone modulated signal. The equipment installed consists of three Model RC200(TP) transmitters and one Model RC210(R) receiver manufactured by Perma-Power Company.

By L. L. PITTS, Supt. Plant Yates, Georgia Power Co.



Case 36 — Florida

Rotary Lift for Paper Mill

ST. REGIS PAPER Company plant in Jacksonville, Florida, installed an oil-hydraulic lift to handle up to 26,000 lb of paper in rolls at one time.

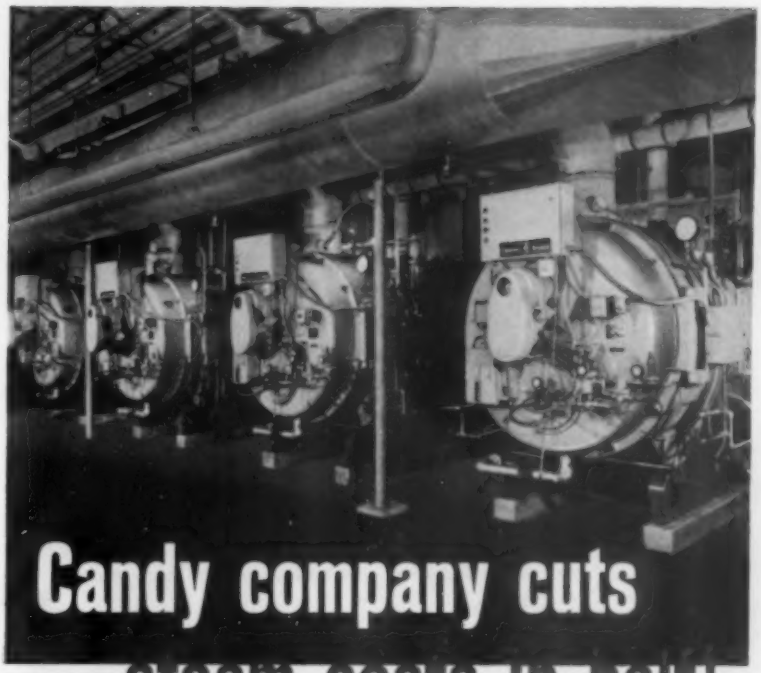
This lift is situated between the slitting line and the banding and weighing operation of the plant. The platform, which measures 24'0" wide x 6'6" deep, is part of an especially engineered and manufactured unit which is an important part of the automated production line.

After the paper is made up into sheets, the rewinder makes one large roll, which is then slit into commercial sizes for use by corrugators. An entire set (five rolls of paper) weighing up to 26,000 lb, is "kicked" off the slitting line after the shaft is removed, and is moved by conveyor to the Rotary Levelator Lift platform, which automatically "catches" the rolls of paper on its special concave surface.

The Oildraulic controller of the lift allows descent just as soon as the momentary pressure push-button is actuated. The lift moves to a point about 14' below this loading level, and stops momentarily. The lift then proceeds downward very slowly, and adjustable pit bumpers contact the underside of the platform, which is hinged. As the lift moves into the floor level, approximately 17' below the loading level, the platform is tilted by the bumpers in the pit, thus, causing the whole set of five rolls of paper to be discharged from the lift platform.

Rotary Lift Company Division of Dover Corporation, Memphis, Tennessee, has manufactured this special lifting equipment which was sold and installed by the Elevator Engineering Company of Tampa, Florida.

FOR MORE INFORMATION on case studies in this issue, write the Editors — Southern Power and Industry.



Candy company cuts steam costs in half!

At Edgar P. Lewis & Sons, Inc., Malden, Mass., four Cleaver-Brooks packaged boilers assure a constant supply of steam at constant pressure — result is higher candy quality at lower cost

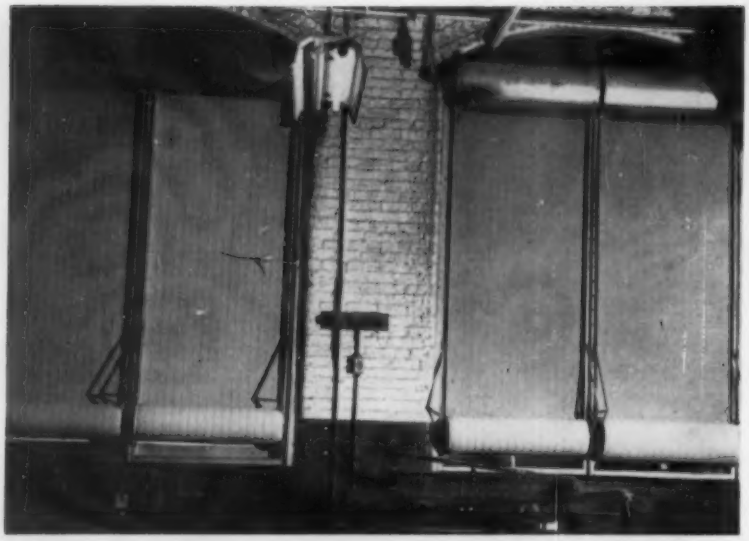
This leading New England confectioner formerly purchased its steam at a cost of $80,000 a year. Mr. Frank Reis, plant engineer, reports that since installation of four Cleaver-Brooks combination gas/oil boilers, operating costs have been reduced by half. What's more, Mr. Reis points out that having a truly dependable source of steam at constant pressure has improved the quality of his company's candies.

Steam is used for both heating and processing. Two of the CB boilers are high pressure—steam produced at 120 lbs. is piped to kettles where the candy is cooked. A pair of low pressure CB boilers operate 24 hours a day furnishing heat for the five plant buildings. Low pressure steam is also used in candy drying operations.

Day-in and day-out dependability is one feature that makes Cleaver-Brooks packaged boilers tops with food processors. Cleanliness, lower installation and operating costs, lasting high efficiency and free starting service are other big plus factors. For complete information on CB boilers (130 models, 15 to 600 hp, gas, oil or gas/oil fired) call your representative or write Cleaver-Brooks Company, Dept. K, 305 E. Keefe Ave., Milwaukee 12, Wis.

Cleaver Brooks
ORIGINATOR AND LARGEST PRODUCER OF PACKAGED BOILERS

SWEET SAVINGS — Jelly strings, marshmallow eggs, chocolate peanuts are just a few of the quality candies made by Edgar P. Lewis & Sons, Inc. Battery of four Cleaver-Brooks boilers keeps steam costs down . . . keeps candy quality up.



Auto-Airmat filters in the window space of an existing wall at the Aragon-Baldwin Mills, Whitmire, South Carolina.

This close-up view of the dirty air side of an Auto-Airmat Filter shows the slugs of lint trapped on the face of the filter and which are in addition to the normal lint deposit that is usually quite uniform.

Case 37 — South Carolina Textile Mill

Collection of Lint in Textile Mills

APPLICATION of air conditioning to Textile Mills has made it increasingly important to recirculate as much air as possible in order to conserve refrigeration. Recirculated air frequently has a high lint load originating from those areas associated with spinning and weaving operations and from opening, picking, and carding rooms. Lint is a bad offender from the point of view of clogging strainers and spray nozzles, bridging across coils and creating a general nuisance.

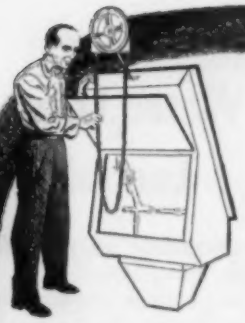
The catching of lint fly is in itself not difficult as the fibers have a well deserved reputation of catching on everything. The problem is to provide some means of confining the material so that its removal can be accomplished with a minimum of effort.

The development of the Auto-Airmat lint filter, which utilizes a very thin web of disposable filtering medium, has solved this problem in a most acceptable manner. The web of media is fed across the face of the filter and automatically replenished as required. The lint laden media is wound into a compact roll for easy removal and disposal.

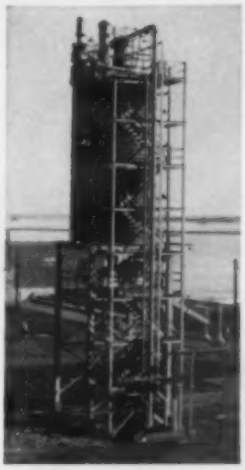
The removal of the lint in the recirculated air has materially reduced the maintenance attention previously required by electrostatic precipitators, air washers, and other components of the air conditioning system.

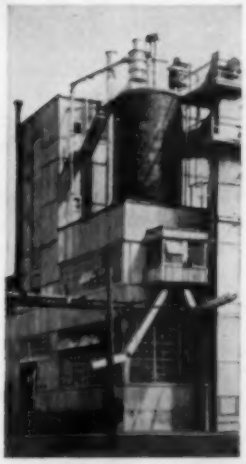
In the past it has been necessary on some installations to service the air washer strainers and nozzles as often as once each shift. This meant attention on the average of two or three times during each 24 hour day. The development of the Auto-Airmat for Textile Mill application has eliminated a great deal of the attention previously required by the air conditioning system and has materially lengthened the intervals between maintenance requirements.

Fig. 1 shows a two section Auto-Airmat filter. The collecting media is supplied in rolls of 800 lineal feet and is automatically transported down the face of the filter by a rotating screen which is driven by a small electric motor located on the clean air side of the filter and controlled by a pressure switch or timer which apportions the media usage to the amount of lint in the air. Recently a new type of media has been developed especially for Textile Mill service. This new media is tissue thin so as to offer a minimum resistance to air flow but at the same time it possesses adequate body to be effective in removing the lint fly. It also incorporates sufficient wet strength to withstand any free moisture which may be encountered.



100 ton Ash Silo straddling R.R. track with full stairway to roof. High capacity Ash Conditioner on open platform with discharge to R. cars.





Ash Silo constructed integrally with boiler house. Ash Conditioner mounted inside building. Bifurcated chute allows R.R. car or truck loading.

Ash Silo for truck loading with enclosed room for ash conditioner.

American Cyanamid Co.
American Gas & Electric Service Corp.
American Sugar Refining Co.
Calvert Distillers
Carrier Corp.
Central State Hospital of Virginia
Chemstrand Corp.
Chicago Pneumatic Tool Co.
Cluett-Peabody Co., Inc.
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Interested in Ash Conveying equipment? Ask your nearest *National* representative to show you, without obligation on your part, how costs can be cut with a National Steam-operated Pneumatic, Hydraulic or Motor-driven System. National offers a nation-wide installation service – high operating efficiency – rugged, wear-resistant pipe and fittings that provide lower maintenance cost per ton of ash conveyed. Consult National now – one contract covers everything, from inception to finished installation. Write us, or nearest representative listed below.

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Also manufacturers of: **National ChipVeyor Systems** for the collection and processing of metal chips and borings and reclamation of cutting oils (Send for Bulletin C-56). **Conveyors** for press scrap and small parts and **Pneumatic Systems** for handling dry granular materials (Bulletin P-58G).

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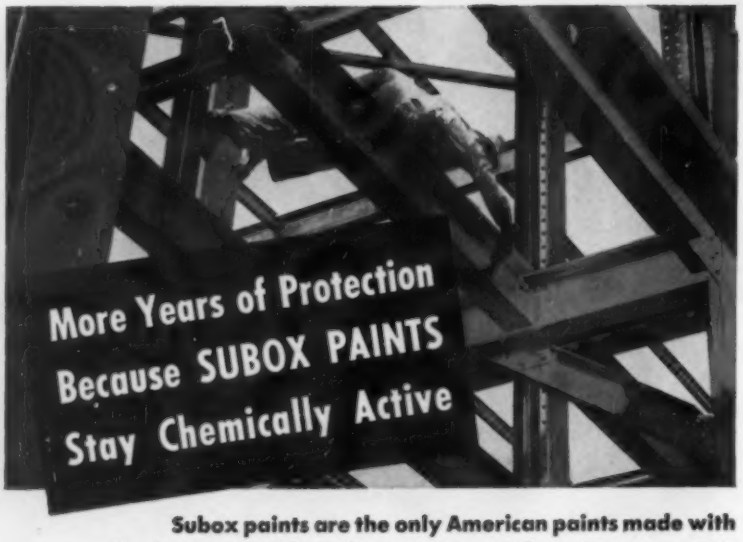
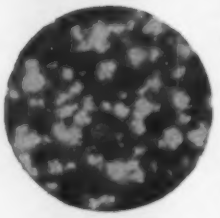


Subox paints are the only American paints made with lead-suboxide. They give extra protection at no extra cost.

SMALL PARTICLES PENETRATE SURFACE

Maximum penetration is achieved because lead-suboxide is a colloidal pigment. Its film is so dense and impervious that two coats of Subox usually equal three coats of other paints . . . often one coat of Subox is sufficient.



CHEMICALLY-ACTIVE METALLIC FILM

Lead-suboxide remains chemically active after Subox paint dries. It reacts with the fatty acids of the vehicle to form insoluble lead soaps, and builds up a reinforced protective film of intertwining metal-bearing fibers.

FIBROUS COAT IS STRONG ADHESIVE

The fibrous film of Subox gradually strengthens and replaces the original vehicle film (which otherwise would become brittle), and creates a strongly adhesive protective coating with an inherently longer life than that of other paints.

Dark areas in above photomicrographs show how pigment increasingly intertwines to form dense, protective film.

In addition to its other advantages and economies, Subox also saves on eventual repainting. The need for expensive scraping and repriming is largely eliminated.

Available in wide color range. Write for color card and the brochure "Subox Paints".

SUBOX PAINTS

Subox Inc.
trade mark

Established 1924
6 Fairmount Plant
Hackensack, N. J.
Subox Company of Canada — Weston, Toronto 15

Case 38 — Southeastern

Water Level Control

OUR PROBLEM was to maintain the water level in a large elevated storage tank, without creating a surge in the main line pressure of 110 pounds.

The first valve installed was a 3" single seat (globe type), operated by a 30 second motor. When nearly closed this valve would chatter, causing pressure surges up to 200 pounds. A double seated valve lowered the surge. However, after a few weeks of operation it would not give complete shutoff due to uneven plug and seat wear.

We corrected this problem by installing a balanced action, diaphragm operated, single seat, globe valve, with the line pressure on the top side of the valve plug.

This valve is opened or closed by the main line pressure, via two solenoid valves, one normally closed, and one normally open.

The materials used are, namely:

1—ATC water level control purchased from Automatic Control Co.

1—Solenoid valve No. 8210A11, normally closed, purchased from Automatic Switch Co.

1—Solenoid valve No. 8210A6, normally open, from Automatic Switch Co.

2—¼" snubbers to control the speed of operation, purchased from Ashcroft Company.

1—3" Globe valve, single seat, diaphragm operated, purchased from Mason-Neilan Mfg. Co.

This installation has been in continuous operation over a year without a moment's trouble or maintenance.

KEEP-UP-TO-DATE
USE SPI
READER SERVICE

See Page 105

Jeffrey offers complete range of spiral conveyors

Here's how Jeffrey fills your exact needs in spiral conveyors:

- Complete range of types—sectional spirals, ribbon conveyors, cut flight conveyors, short pitch conveyors, double flight conveyors—all in a wide range of diameters and thicknesses.
- Stock is maintained on all widely used types, permitting Jeffrey to make fast shipment.

Standard conveyors are made in mild or abrasive resistant steels. Where heat-resistance or corrosion-resistance is required, you can select Jeffrey spirals in stainless steel, brass, Monel, aluminum, or other special metals.

With Jeffrey spiral conveyors you get a complete selection *plus* extras in quality—precision fit, smooth flight surfaces and non-toxic protective coating. For full information write for Catalog 951. The Jeffrey Manufacturing Company, 898 North Fourth Street, Columbus 16, Ohio.

Centrifuge cake ranging from 62 to 67 per cent solids are transferred to a mixer by a 16" diameter Jeffrey Spiral Conveyor at the lime reclaiming plant of the City of Lansing, Michigan.

JEFFREY

CONVEYING • PROCESSING • MINING EQUIPMENT...TRANSMISSION MACHINERY...CONTRACT MANUFACTURING

Case 39 — Virginia Furniture Factory

Congestion Eliminated

THE STANLEY Furniture Company, Stanleytown, Va., planned to build a new plant which would increase their previous capacity by 65%. A conveyor system was required to eliminate the congestion which would result from the shop trucks and pallets formerly used and to provide for efficient storage and flow of material through the various stages of production.

Material to be handled included various size pieces of wood and rough cut stock, finished pieces and assembled furniture. Handling equipment was purchased from Harry J. Ferguson Co., and included both roller conveyors and belt conveyors.

Roller Sections

The Roller Conveyor sections are arranged in bays of closely spaced parallel lines. Located in the aisles between the bays are transfer cars consisting of gravity roller conveyors mounted on casters and riding on angle track. Transfer cars serve all the conveyors on both sides of the aisles and run the full length of the aisles.

The conveyor sections adjacent to the work stations carry stock to and from the station as well as provide for temporary storage of waiting loads of parts. Individual pieces of stock are stacked on thin pallets or runners and moved in unit loads to the next operation.

Storage Line

Each of the parallel conveyor lines serves as a storage line or a transfer line and, in conjunction with the transfer cars, permits the movement of stock to any position in the plant from any other position.

In some cases, conveyor sections have been placed on electric-hydraulic lifts to raise material to machinery working height or mounted on casters to roll work into the most convenient position.

The outstanding feature of the new Stanley Furniture Plant is the efficient flow of material that the conveyor system provides. Without the use of conveyors, the present or future capacity could not have been realized within the limit of the plant's size.

Although the building, production, machinery and conveyor system were all new and part of an integrated plan when designing this plant, the methods and equipment utilized can be adapted wholly or in part to existing facilities to accomplish similar gains in capacity and efficiency.

Transfer cars roll full length of aisle and provide easy transfer of material from one line to another.

Chair assembly belt conveyor.

How many spare parts should you stock per pump?

"You may be *over*stocking," says Phil Olmstead, *Chief Engineer*, Goulds Pumps, Inc.

"There are many times," one plant manager told me recently, "when we have a *higher* inventory of spare parts than the people we buy from!"

No laughing matter, this—many plants today are faced with the difficult problem of keeping stocks *adequate*, yet keeping inventories *down*. If your problem is *pump parts*, you can do both—by *interchangeability!*

For instance, take the Goulds Fig. 3405 single-stage centrifugal. You can get it in 33 sizes, with 66 combinations possible, considering right- and left-hand rotation. *Just 3 groups of parts fit all 66 combinations of this pump!*

That means that, for every three to five pumps of a given group size (sizes are divided up three ways into "small," "medium," and "large" groups), we can recommend that you stock just one shaft, one set of bearings, sleeves, mechanical seals or packing. *In short, all parts are interchangeable except casings, casing covers and impellers!*

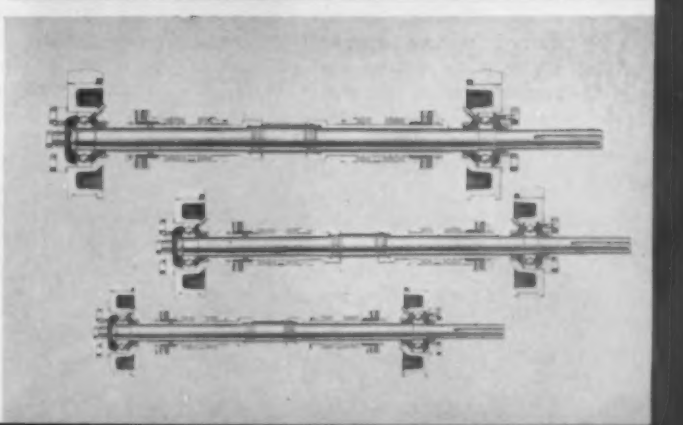
How much can that cut down your inventories? You figure it out—*one* set of group parts for as many as *five* pumps, where you might expect to stock one for each. *Three* groups for *thirty-three* different sizes of pumps—a *91% cutdown!*

And here are three more advantages to consider:

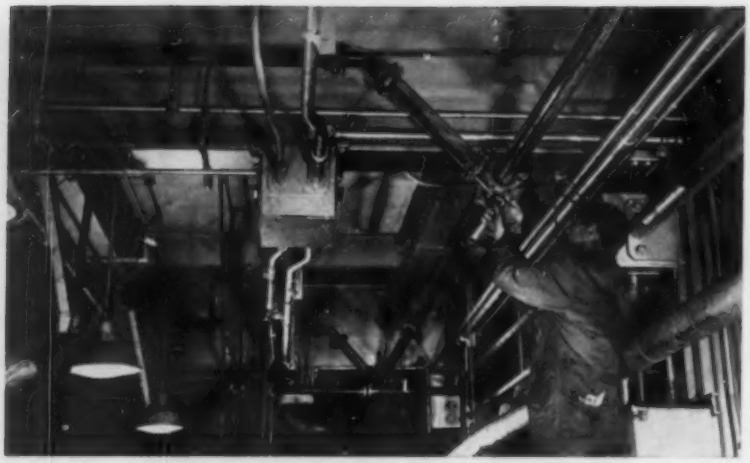
1. You can make changes *in the field* to meet new needs.
2. You receive off-the-shelf delivery of parts you order.
3. Initial cost is lower due to standardization in manufacture.

The next time you talk to a Goulds representative, ask him to show you how interchangeability works in our Fig. 3405 . . . and in the rest of our line, too. If you want information right away, drop a line to me, Phil Olmstead, at Goulds Pumps, Inc., c/o Dept. SP-109, Seneca Falls, N. Y. I'll see that you get all the information you want.

GOULDS PUMPS



Just three groups of shafts, sleeves, bushings, glands, packing, ball bearings, bearing shell, end caps, closures and gaskets for Goulds Fig. 3405 pump to fit all 33 pump sizes.



Pipefitter John A. Bostic, at Celriver Plant, adjusts flanges on 3-inch Pyrex glass pipe, used as drainline from acetylation vats.

Project engineer Donald McGinnis, of Celanese Corporation's Celriver, S. C., plant, points out that metal pipe at left which handles same amount of waste as glass pipe at right, is larger because buildup occurs inside metal pipe over period of time.

Case 40 — South Carolina

Glass Drainlines for Celanese at Rock Hill

FOUR ROWS of reactors used in the manufacture of cellulose acetate drained into a series of gutters on the main floor of the Celriver, S. C., plant of Celanese Corp. The gutters led to drainlines which carried waste to the basement and into main waste gutters.

The waste consisted of sulphuric acid, acetic acid and a cellulose acetate effluent. If water were accidentally introduced into the line, the mixture precipitated into a hard, sticky "dope" that plugged the drainlines.

Plant engineers looked for an efficient material to handle the mixture. They wanted a line that could be easily dismantled when plug-ups occurred.

A high silica iron drainline resisted corrosion, but breakage occurred during dismantling, and steam could not be used in cleaning because of the thermal shock. Stainless steel drainlines brought corrosion failures.

A Pyrex brand glass drainline was installed. The line consisted of 220 feet of three-inch glass pipe, 65 flanged joints, 32 field cut and beaded joints, eight 3-inch tees, nine 3-inch 90-degree and nine 3-inch 45-degree elbows. Seven floor drains were connected into the line. The glass was inserted into the existing floor fittings.

Engineers found that removal of the precipitated dope in the line was much easier and quicker. Because of the smooth surface of the glass, they found that sections could be removed and the dope manually pulled out. This eliminated the necessity of removing the pipe and steam cleaning it. By inserting a hose in the opened end of the line, the dope could be flushed out without dismantling the line. The visibility factor proved advantageous because the engineers could visually locate and measure extent of the scale or dope build-up.

Case 41 — North Carolina Processing Plant

Continuous Cooling Replaces Batch Process

CONTINUOUS operation with the aid of conveyors replaces the customary batch system of poultry chilling and avoids endless handling. It also saves the expense of upkeep on the vats and heavy wear on floors.

This unique equipment, manufactured by Frick Company, comprises a long stainless-steel flume, in which very cold water is flowing in one direction, and freshly killed poultry is moved by a conveyor in the opposite direction. The flume, when sized for handling 30 to 50 birds per minute, measures about 54 feet long by 54 inches wide by 30 inches deep.

The conveyor consists of closely-spaced fingers or rakes: these sweep the poultry slowly through the water, giving a cooling time of about 1⅛ hours.

The poultry enters at one end, at approximately ambient room temperature. At the other end the cold water supply is rained over the birds at a temperature approaching 32 deg. F. When the birds are lifted out of the flume by the fingers, their temperature is 37 deg. or lower.

The original of these chillers is in operation at Holly Farms Poultry Processing Plant in Wilkesboro, North Carolina. This unit is handling fifty birds, weighing 2½ lb each, per minute.

Being Robbed of Fuel Efficiency? Call Your N&W Coal Man...

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Ext. 3313, 423, 3249, 3732
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Telephone Liberty 2-2229
Boston 10, Massachusetts

CHICAGO
660-664 Marquette Building
140 S. Dearborn Street
Telephone RAndolph 6-4634
Chicago 3, Illinois

CINCINNATI
913 Dixie Terminal Building
Telephone DUnbar 1-1325
Cincinnati 2, Ohio

CLEVELAND
Room 722,
The Illuminating Building
Telephone MAin 1-7960
Cleveland 13, Ohio

DETROIT
1514 Book Building
Telephone
WOodward 1-2340 or 1-2341
Detroit 26, Michigan

ST. LOUIS
2059 Railway Exchange Building
Telephone MAin 1-1180
St. Louis 1, Missouri

WINSTON-SALEM
1105 Reynolds Building
Telephone PArk 2-7116
Winston-Salem 1, North Carolina

If you suspect that your present coal may not be delivering the most satisfactory combustion, it's time to call in your Norfolk and Western Coal Man.

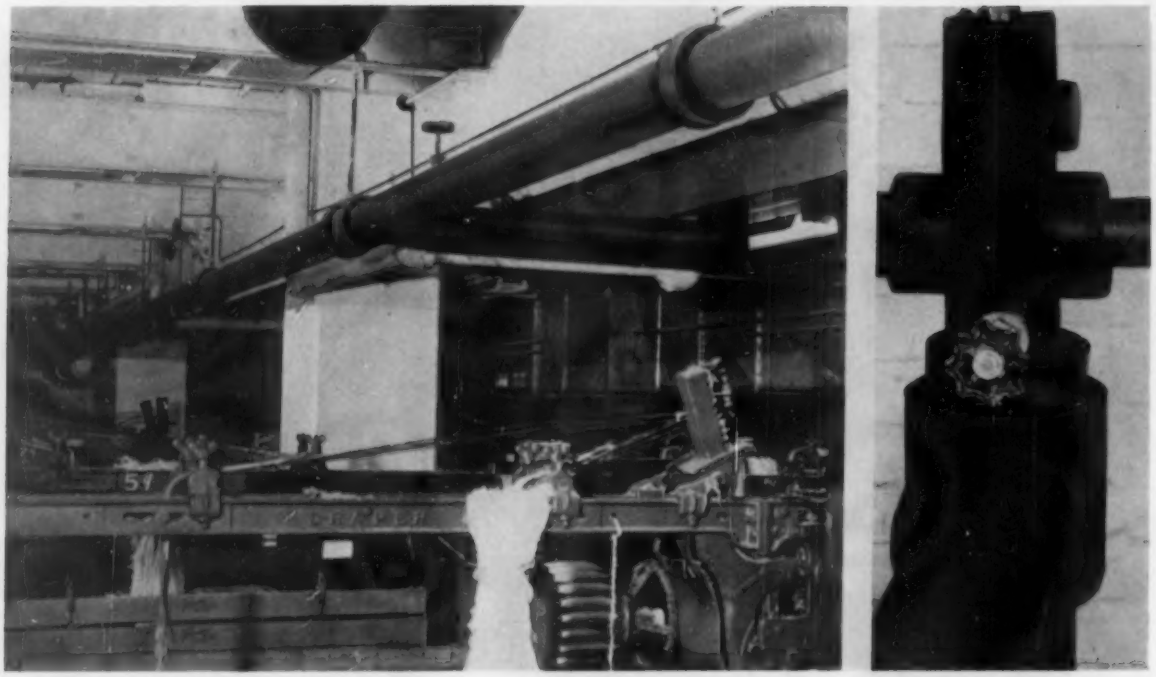
These men, who staff our offices in strategic cities across the country, know coal utilization. They will work with your engineers in determining the exact type of coal that will permit you to operate at peak efficiency.

We feel confident that you can find the coal best suited to your needs among the many fine coals mined along the lines of the N&W. These coals, known collectively as Fuel Satisfaction, are mined by the most modern methods, prepared in plants that are electronic marvels. They are helping many of the nation's leading coal users to operate at maximum efficiency.

But whether or not Fuel Satisfaction is your choice, you can be sure of an objective, analytical approach to your coal problems. For competent assistance and advice, get in touch with one of the N&W coal bureaus listed here.

Norfolk and Western RAILWAY

CARRIER OF FUEL SATISFACTION



Condensation on these overhead water pipes caused a moisture problem in the weave room of Dundee Mills, Inc., at Griffin, Georgia, until the pipes were insulated. Fabricating joints proved no problem to plant maintenance men who installed the foamed plastic pipe covering.

Case 42 — Georgia Textile Mill

Condensation Stopped

DUNDEE MILLS, INC., Griffin, Georgia — manufacturer of towels, flannelettes and diapers — improved production and eliminated a potential hazard when it found a way to stop moisture condensation on overhead industrial water supply lines.

Moisture caused by warm, humid air coming in contact with cold water lines dripped down on threads and cloth and made floors slippery in the weave room until Dundee installed a flexible foamed plastic pipe insulation with a built-in vapor barrier.

Armaflex, manufactured by the Armstrong Cork Company, may be used on lines operating up to 200 F. It is made with a closed cellular structure that positively stops air and moisture penetration. Designed for exceptional ease in handling, it is so flexible it can be tied in knots, so resilient it springs back to its original shape when untied.

Armaflex, which is avaliable in both sheet and pipe covering form, is also easy to install because it can be split and snapped over existing lines and then sealed with a waterproof adhesive or else it can be slid over new lines before they are put in place. Joints are easy to fabricate. Dundee's own maintenance crew at the Griffin Plant did an efficient job of installing the Armaflex although the crew had never installed any insulation before.

Approximately 300 feet of 3" industrial water supply lines to feed an air change unit were involved. The original hangars were left in place and insulated with 4" wide Armaflex sheet material that was ¾" thick. All material used, both pipe covering and sheet form, was ¾" thick.

After the insulation was installed, condensation was eliminated, the floors are now dry and production has been greatly improved with the elimination of the condensation dripping down on threads and cloth.

Case 43 — Florida

Electric Steam Generator

CONTINENTAL Optical Co., like many other industries, decided to move their manufacturing operations South. This manufacturer of optical products, formerly located in Rochester, New York, employs approximately 120 people in Clearwater, Florida.

Florida Power Corporation working with Continental, investigated the generation of steam by electricity for the new plant's requirements. Pantex Manufacturing Co. recommended two electrode type steam generators, a 7 hp and a 14 hp unit operating on 440 volt, 3 phase, 60 cycle current. These units were purchased through the George L. Simonds Company of

How American Brake Shoe Maximates Production

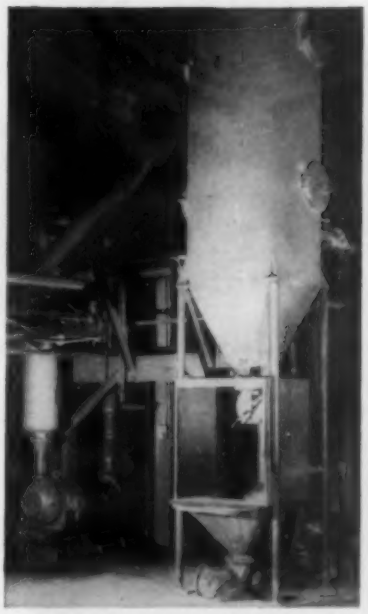
When the American Brake Shoe Company began an extensive modernization program at its New Castle, Delaware plant, one of the first steps management took to maximate production—that is achieve maximum output at less cost—was to install a Hoffman pneumatic conveying system for keeping bentonite, dextrin, silica flour and other materials *on the flow*. With a Hoffman exhauster furnishing the air as well as suction for the handling system, and use of components described here, the equipment not only simplified bulk conveying chores but paid its way in a few months by providing substantial production, material and labor savings.

MATERIAL INTAKE VALVE

Materials are introduced into the air stream through a unique nonclogging intake valve attached to the bottom of a hopper and flow smoothly through pipe lines to any one of six primary cyclone storage tanks more than 350′ distant. Hoffman intake valves insure the uninterrupted flow of dry, powdery or granular materials through all types of vacuum conveying systems. Suitable for use with 2″ through 6″ pipelines, they are equipped with standard 8″ flanges and can be easily attached to bins, hoppers, or dust collectors. Connected equipment is protected from exposure to the full suction of the system by a separate air inlet. The material handling rate can be adjusted while air is flowing. Thorough mixing insures smooth transit.

HINGE VALVE

Self-cleaning Hoffman hinge-type discharge valves are designed for air-tight closure against a head of material. The one-piece valve body is cast of gray iron with its rubber-faced disc and seat completely inside the casing. Lever linkage permits operation by means of chain or cable from a remote station. Provision can also be made for air or hydraulic cylinder actuation of the valve.



A portion of the Hoffco-Veyor system installed at the American Brake Shoe Co. plant in New Castle, Delaware.

ROTARY VALVE

Chain driven rotary discharge valves of cast semi-steel construction feed the material in controlled quantities. Designed for interchangeability of various types of fabricated and cast rotors, valves are equipped with torque limiting drive sprockets for protection against jamming and overloading. Equalizing connections permit attachment of bleed lines to vacuum or pressure source. Inspection of the interior can be made through an access port without disassembly of the valve.

PERISTALTIC VALVE

Controlled expansion and contraction of rubber diaphragms permit discharge in measured quantities. Since there are no internal moving parts, even coarse abrasives can be handled with minimum wear. Sheet rubber diaphragms are easily replaced whenever necessary.

COMPETITIVE ADVANTAGES

In handling quantities of dry, free-flowing powdery and granular materials such as sand, shot, chemicals, etc., Hoffco-veyor systems and components speed production—provide many genuine benefits and advantages which are reflected in higher profit margins. These include:

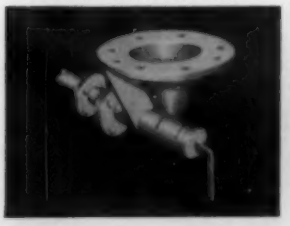
- flexibility
- cleanliness
- time saving
- lower initial cost
- easy installation
- material saving
- labor saving
- pay for themselves

FREE ENGINEERING SERVICE

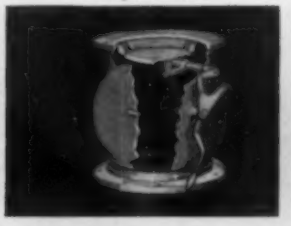
If you have a materials handling problem, you can solve it with either a complete Hoffman system or any of its parts which may be purchased separately to fit your needs. Available equipment includes dependable centrifugal blowers/exhausters, cyclones, collectors, material intake, hinge, rotary, butterfly and peristaltic valves as well as filter bag collectors. We'll be glad to make a free engineering survey to determine how you can improve your manufacturing methods by maximating production with a really tight method of material handling. Send now for a free descriptive booklet. Please write:

Air Appliance Division
Dept. EM
U. S. Hoffman Machinery Corp.
103 Fourth Avenue
New York 3, New York

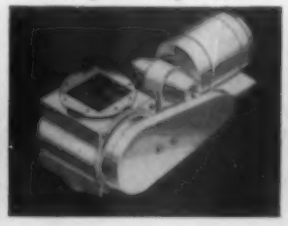
Material intake valve



Hinge valve



Rotary discharge valve



Peristaltic rubber valve

Here's a steam trap

..and for seven sound reasons:

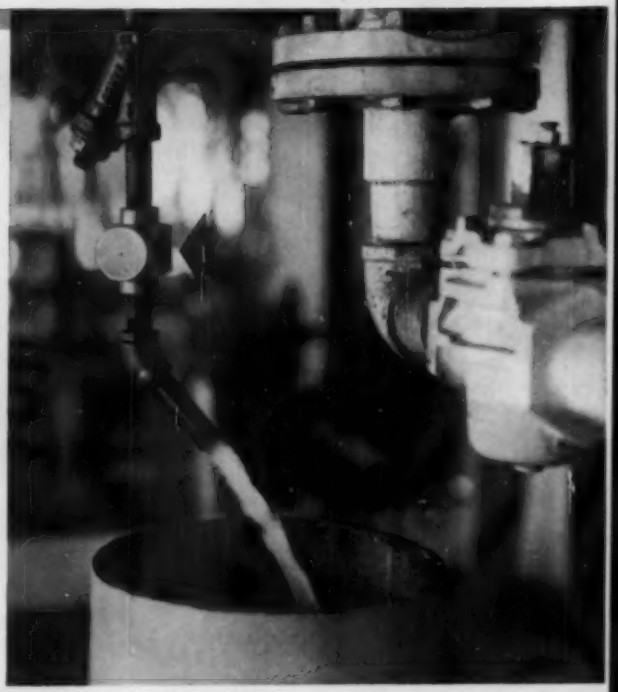
1. *Simplicity* – only one moving part.

2. *Maintenance* – practically zero. 3. *One trap* for all pressures from 10 to 600 psi.

4. *Uniform performance* – operates equally well on heavy, light, or no condensate load.

5. Operates against *back pressures* up to 50% of inlet pressure. 6. *Rugged* – unaffected by superheat, water hammer, vibration, or corrosive condensate. 7. *Minimizes inventory* of spare parts.

Sarco TD's on outdoor blending tanks of Shell Oil Company, Sewaren, New Jersey, are installed vertically, instead of in the usual horizontal position, in order to drain coils after shut-down, thus preventing freezing.



1. DRAINS AND VENTS

at start-up. Immediately rids lines of condensate and air to permit normal operation. This eliminates the need for manual opening of valves to drain the system.

CONTROL COSTS

In these days of sharp emphasis on cost control, Sarco Thermo-Dynamic TD Traps are helping plants to deliver the full productive power of every pound of steam. And because the TD has no mechanism . . . no gaskets . . . no narrow channels to clog, maintenance cost on the TD is almost nil. As one plant engineer puts it: "This TD is a cinch to install, it's no bigger than a tee fitting, and it works in any position. The TD is the one steam trap we can install and forget."

CHOOSE THE RIGHT TRAP

There's an infinite variety of applications, temperatures, pressures and loads in industrial steam piping. Sarco can help you select the right trap for every job of air and condensate removal, saving you money and down-time.

HOW ABOUT THE BUCKET TRAP?

With the development of the patented* Sarco Thermo-Dynamic Steam Trap, the bucket trap suddenly aged 50 years. In a nostalgic way we feel somewhat sorry, because *our* Sarco bucket trap has made us thousands of friends. But frankly, it's no match for the new Sarco TD. Progress is progress.

Some of our customers who are getting satisfactory service from our bucket traps may prefer to replace their old Sarco bucket traps with *new* Sarco bucket traps. If you feel this way, we're flattered enough to keep on making Sarco Bucket Traps – strong, sturdy and durable as ever. Let us suggest, however, that you at least give the new Sarco Thermo-Dynamic Steam Trap a try, under your most exacting conditions.

*U.S. Pat. No. 2,817,353 T. M. Reg. U. S. Pat. Off.

that does what a steam trap should

2. DISCHARGES

air and condensate at steam temperature as rapidly as they collect. Does not wait for a bucket of steam to leak through a small orifice.

3. CLOSES TIGHTLY

There is no continuous bleed; nor is there loss of buckets of steam as in the bucket trap which must discharge steam with each cycle.

MAINTENANCE TIME: 40 SECONDS!

How long does it take your maintenance crew to service an ordinary trap? If it's over a couple of minutes, you're throwing away valuable time. The Sarco TD can be cleaned, blown out, if necessary, and reassembled on the line, in as little as 40 seconds. 6345-B

Sarco can give you impartial advice on trap selection because Sarco makes All—5 Types:

Thermo-Dynamic . . . Thermostatic . . . Liquid Expansion . . . Float Thermostatic . . . Camlift Bucket

SARCO COMPANY, INC. 635 Madison Avenue, New York 22, N. Y.

STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

Winter Haven, Florida.

The steam is generated by the resistance of the water to the flow of electricity between the electrodes. The flow of electricity is directly proportional to the steam load and is controlled by varying the water level on the electrodes. The unit is 98% efficient at maximum load.

Continental Optical turns on both units at 7:30 each workday morning. By 9:00 A.M. the entire system of plating and washing tanks, air and sawdust dryers are up to temperature. The smaller unit is then shut down and the load is carried by the large unit. The entire system is trapped and all condensate, except that used in direct water heating, is returned to the receiver and then to the boiler.

There is no fire hazard, no venting problems, and no burners to clean as with conventional fuel fired boilers. The compact generators are located in the machinery room with insulated steam and return lines carrying the steam to the points of use in the fully air conditioned plant.

The flameless, efficient operation of the electric generators is a natural component for this modern manufacturing facility.

Case 44 — North Carolina

Steel Shelving Solves Storage Problems

CERTAIN accounting activities of a leading textile manufacturer are maintained in Charlotte, N. C. for all of the company's plants. These activities include accounts receivable, finished goods inventory control, sales analysis, and billings control. Processing of all information is by Remington Rand and IBM data processing equipment.

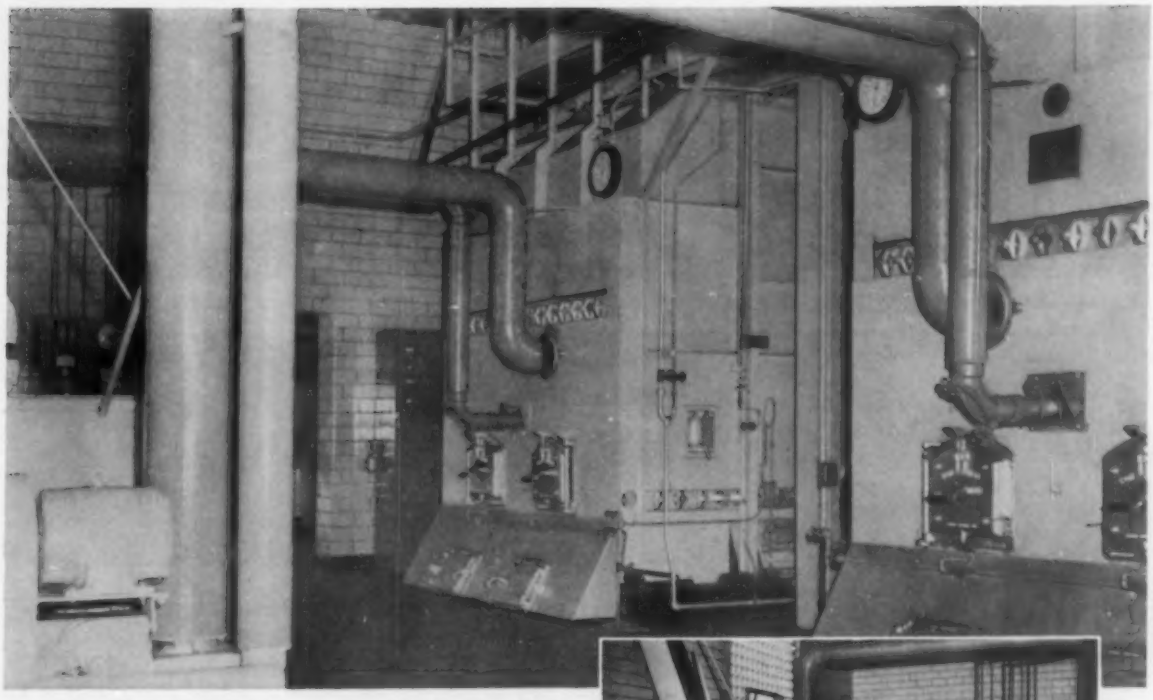
Storage of forms posed quite a problem for this extensive operation. Blank card stock is purchased in quantities of ½-million cards and delivered to two rooms — one adjacent to each of the main data processing areas. Each of these rooms handles about a month's supply of forms, or approximately two hundred thousand cards. More than 2,700 sq ft of shelf space is needed in each room to accommodate this load.

To store all of these cards in the limited space available, the company had to find a way to make every cubic foot of storage area productive. Adjustable steel shelving offered the best solution to this problem. Shelves extend to the ceiling, and are adjustable on 1-in. centers to allow each storage section to be set up for maximum capacity, without any wasteful dead space above and between the stored cards.

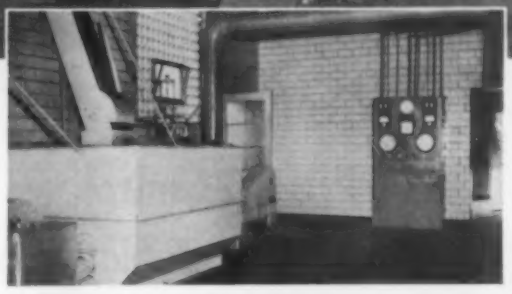
Adjustable steel shelving, manufactured by Penco Division, Alan Wood Steel Co., was chosen for use throughout the storage areas. This new shelving, known as Penco T-Line shelving, uses precision-formed channel clips to support shelves.

Seventy-seven shelving units are used, to provide more than 1,800 running feet of shelf space. Units are 10-ft, 3-in. high, reaching to the ceiling. In both storerooms, shelves run completely around the walls. One room has a double row down the center, and the other uses a single central row.

In the Univac card storage room, single-depth shelves are located around all walls with a double row down the center of the room. Aisles are 3 feet wide to avoid waste space.



Two Iron Fireman Pneumatic Spreader stokers with B & W water tube boilers are shown in operation at the Palmyra, Ohio plant of Universal Sewer Pipe Co. "This is our fifth plant," said John Satow, secretary, "to be equipped with Iron Fireman stokers. We started using Iron Fireman equipment about 25 years ago and have been very pleased with the operation and dependability of all installations." The company uses the stoker-boilers to furnish process steam for the manufacture of terra cotta pipe.



Coal hopper and control panel for the Palmyra, Ohio plant installation. Coal of almost any grade from lignite to the best bituminous in sizes from ¼" slack to 2" top size is fed from these bins. Air is automatically adjusted to fuel feed rate and condition of the fuel bed, maintaining a clean, efficient fire.

Don't overlook the advantages of AUTOMATIC COAL FIRING

What are these advantages?

1. In many areas coal is the most economical source of heat, producing from 15 to 50 per cent more heat per dollar than other fuels.

2. Iron Fireman stokers convey, dry, pre-heat and precisely meter low cost, small size coals of almost any grade. They convey the fuel from sealed bins directly to the fire, without additional handling.

3. Automatic controls accurately pace the fire to the load, keeping fuel and air in perfect balance.

You will be pleased at the precision, cleanliness and economy of modern Iron Fireman coal firing techniques. Not only do these automatic stokers cut hand labor, but they operate with such high efficiency that they will fire even the lowest and cheapest grades of coal—grades that are not suitable for hand firing.

For up-to-date information on modern Iron Fireman coal firing, please mail the coupon.

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT FOR HEATING, PROCESSING, POWER

IRON FIREMAN MANUFACTURING CO.
3139 West 106th Street, Cleveland 11, Ohio
(In Canada write to 80 Ward Street, Toronto, Ontario)

Please send me more information on Iron Fireman commercial and industrial stokers.

Name _____

Address _____

City _____ Zone _____ State _____

For more information, use Reply Card—Page 105

Insulation for Outdoor Plant

Case 45 — Texas Butadiene Plant

THE CLIMATE is mild in Channelview, Texas, but during much of the year extremely high humidity brings continual rain. These were the conditions that Texas Butadiene faced when construction started on the company's new "open air" chemical plant.

Carey Alltemp was used as the basic insulating material for all piping and equipment over 400 F, and wherever possible, it was covered with Weatherproof Jacketing. This assured minimum delay in construction time, in the event of recurring rains. Workers were able to begin applying more insulation when the rain stopped.

Reductions in plant maintenance inventories and storage requirements were other factors that influenced Alltemp's selection, according to Mr. Pierson, the chief engineer. Since it can be used for all temperatures from ambient to 1600 F, the necessity of stocking two different kinds of material to cover medium and high temperature applications was eliminated.

Case 46 — West Virginia

Precise Control With Variable Capacity Pump

SUPPLYING pulp to the paper machine head box at extremely uniform head and volume this *ACAP* pump at the Charleston, S. C. plant of West Virginia Pulp and Paper Co. is the largest variable capacity pump ever manufactured by Allis-Chalmers.

Installed as part of a new process developed by West Virginia Pulp and Paper for making extensible paper, the *ACAP* pump is employed because of its inherent ability to precisely vary capacity and head through manual or automatic control without need for variable pump speed. (A movable, non-corrosive cylinder provides a changeable clearance between the pump end of this cylinder and the revolving impeller, thereby determining amount of recirculation; this arrangement regulates flow at the discharge nozzle and reduces air blinding.)

The 42- by 36-inch pump is rated 33,500 gpm at 52-ft head. Reduced flow is accomplished by opening the clearance with the small motor in the photo's upper righthand corner, rather than using valve throttling, to improve mixing and eliminate plugging.

USE SPI READER SERVICE ON PAGE 105

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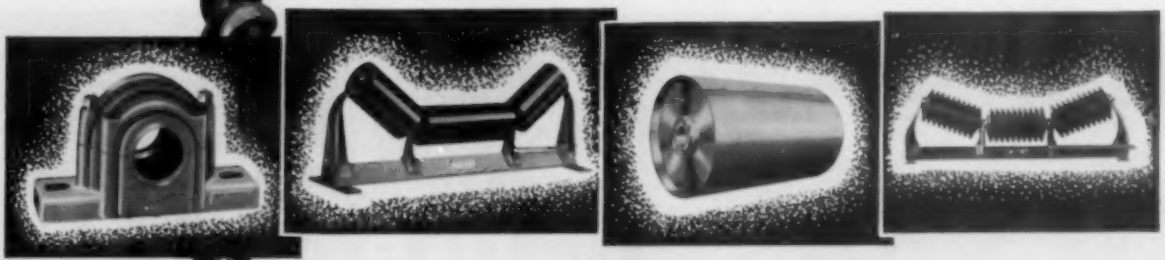
Continental

"-the smartest distance between two points!"



For the long haul or the short run, your nearby authorized Continental Distributor can furnish the *right* equipment for *your* job. He has in stock or readily available from a nearby Continental warehouse just the components you need. Continental's continued operation and these strategic stocks assure you of reliable service over the years.

In any elevating, conveying or power transmission application there is a genuine Continental-engineered, Continental-fabricated component to fill the bill perfectly, backed by Continental's 127 years' experience in designing and manufacturing quality equipment for American industry.

Your Continental Distributor will be glad to consult with you on your conveying and elevating requirements.

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Now in our second century of leadership

Ask your Continental Distributor for a copy of the new 88-page Continental Belt Conveyor Data Book showing products and installations, and giving specifications in diagrams, charts and tables — all in simple, easy-to-understand form. Ask for Engineering Data Book ID-591.

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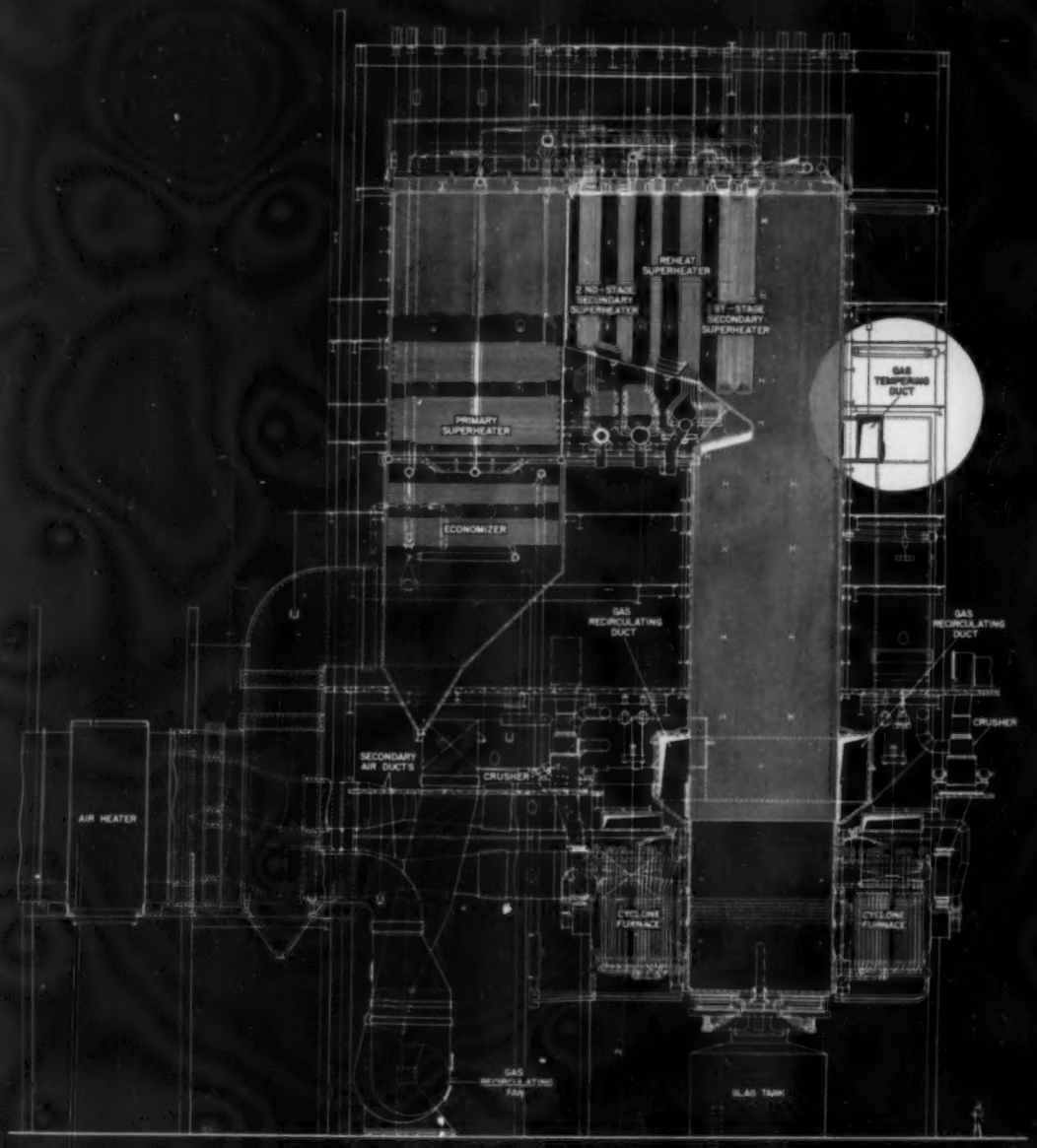
Gas Tempering: **Report No. 2**

Electric Utilities Find Points Way to



B&W Cyclone Furnace Universal Pressure Boiler.
Coal is the primary fuel with oil as an auxiliary fuel.

Gas Tempering Fuel Economies

...Lets You Burn The Most Economical Fuel Available— Coal, Oil or Gas

Gas Tempering—is the reintroduction of cool flue gases near the furnace outlet to control the temperature of the gases entering the convection surface. It is the practical means to help you burn the most economical, most easily available fuel.

Gas Tempering enables you to burn a variety of coals without slagging.

It minimizes external corrosion of superheater tubes. It reduces metal temperature, cuts need for high alloys, prolongs tube life, regardless of the fuel burned.

In effect, gas tempering allows you to adjust the size of your furnace to meet the characteristics of the fuel. This is done by varying the amount of tempering to chill the furnace exit gases to a temperature known to be satisfactory for the fuel burned. The gases are cooled but the total heat available to the superheater remains the same.

That's Why with Gas Tempering, you no longer need to pass up attractively-priced fuels.

Definitive Booklet: If you'd like to learn more about the economies and design flexibility available to you through Gas Tempering, write for Bulletin G-96. Address: The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

Major Advantages of B&W Gas Tempering

. . . It cuts overall plant costs because the smaller size unit requires a smaller building per kw, a lighter foundation, less structural steel and shorter steam leads.

. . . It enables you to utilize the most economical available fuels. It permits the burning of a variety of coals without slagging, minimizes external corrosion of superheater tubes, and assures safe metal temperature, thus prolonging tube life, regardless of the fuel fired.

. . . It provides safe superheater tube temperature by positive gas temperature control; it protects superheater during startup and under all operating conditions.

. . . It makes it safer to design for economies offered by operation at steam temperatures of 1050 F and above.

B&W

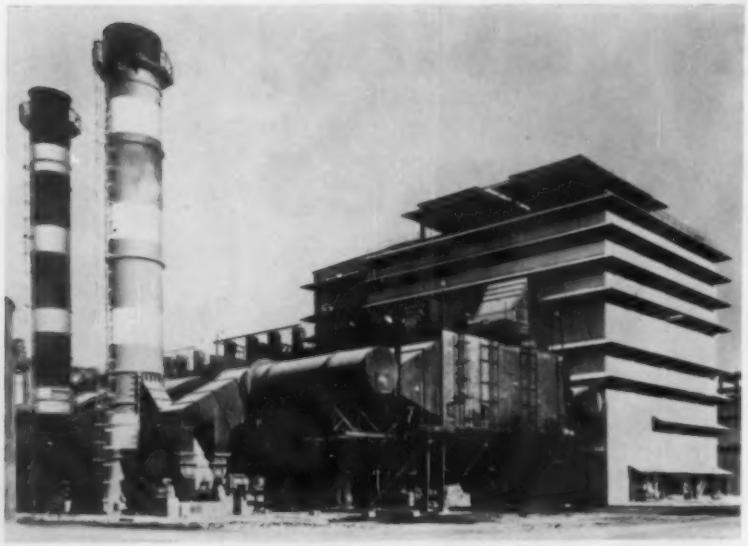
THE BABCOCK & WILCOX COMPANY

BOILER DIVISION

G-934

Case 47 — Jacksonville, Florida Paper Mill

Air Pollution Prevented at St. Regis, Jacksonville Plant



These precipitators recover salt cake worth $3,000 per day.

WHILE the "good neighbor" motive is the principal factor in most electrostatic precipitator purchases, with prevention of air pollution as the primary objective, some industries — notably kraft paper mills — find that value of materials recovered by the precipitation process is great enough to provide a satisfying off-set against the cost of the equipment.

At the St. Regis Paper Company's plant in Jacksonville, Fla., for instance, it has been estimated that the salt cake recovered by the battery of Koppers' precipitators handling gases from the black liquor recovery boilers amounts to more than $3,000 per day.

Thus the equipment helps pay for itself and returns to the purchasing company a substantial daily reward for being a "good neighbor" in the community.

Case 48 — Memphis, Tenn.

Drying Time Reduced for Furniture Plant

AN ELECTRIC infra-red oven is used to speed up drying of ink sealer that is roller coated over printed wood grains at the Memphis Furniture Mfg. Co., Memphis, Tenn.

The two 7-foot sections of the oven are doing the work that three 9-foot sections of a previous oven were doing, according to T. C. Faulk, superintendent of the plant.

These ovens have temperature controls which may be set from 0% to 100% of rated power. They and the conveyor are set for one minute and five seconds flash off, 42 seconds of heat and 35 seconds of cooling.

Heat loss from stray radiation is eliminated. Temperature may be changed by the turn of a dial on the temperature control whenever the oven is used for a different operation. The ovens, which have lava-coated, ceramic-type, infrared generators were furnished by Dry Clime Lamp Corp.

Case 49 — Southern Textile Mill

Improved Control Boosts Production

A SOUTHERN textile mill needed closer control and more production on a slasher operation. They changed from a hand operated control valve setup to controller actuated OPW-Jordan sliding gate diaphragm control valves for more efficient production. They used nine ¾" sliding gate diaphragm control valves with seven on the seven can slasher, one on the size box and one on the size mixing kettle.

This enabled them to get closer temperature control, minimize their maintenance with the sliding gate seats in the control valves and improve efficiency of their operation.

The machines were rebuilt and changed so that the mill could use them in today's modern, up-to-date plant. The production superintendent and maintenance men are very well pleased with performance.

—MEMO—

Call Mundet

...for the answer to rising power costs and maintenance problems

Operation of power and processing plants at today's high steam temperatures and pressures requires the most efficient thermal conservation control.

You have the assurance of efficient, economical operation under modern conditions when you call upon Mundet Thermal Conservation Services. Mundet offers the broadest range of insulation products now available to Industry. This product variety enables us to provide the **right** insulation for your needs.

Mundet engineering and contract services are available through conveniently located branch offices and authorized distributor-applicators . . . to meet the most exacting requirements for steam-electric generating efficiency and trouble-free maintenance.

MUNDET

Two Mundet products widely used in power plants are Mundet "Tri-Calite" calcium silicate insulation and Mundet "Custom-Molded" 85% Magnesia.

For latest information on these cost-saving products, mail coupon below.

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TULSA, Oklahoma
Kelley Asbestos Products Company
212 No. Boston Street

Mundet Cork Corporation, Insulation Division
7105 Tonnelle Ave., North Bergen, N. J.

Send data bulletins on Mundet "Tri-Calite" calcium silicate and 85% Magnesia insulating products.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

For more information, use Reply Card—Page 105

Case 50 — South Carolina Public Utility

Bearings Reclaimed

Left foreground — Machining facing surfaces on shaper. Background — Cutting oil rings with vertical boring bar. Center — Horizontal boring bar mounted in bearing housing to complete machining of bearing surfaces.

RECLAIMING worn bearings on fans has proved highly satisfactory at South Carolina Electric and Gas Company's Plant Hagood in Charleston.

The first step is of course melting the old babbit out of the bearing, after which the inner surfaces are cleaned and tinned. A core mold of approximately one inch smaller diameter than the shaft is placed in each half of the bearing and babbit poured.

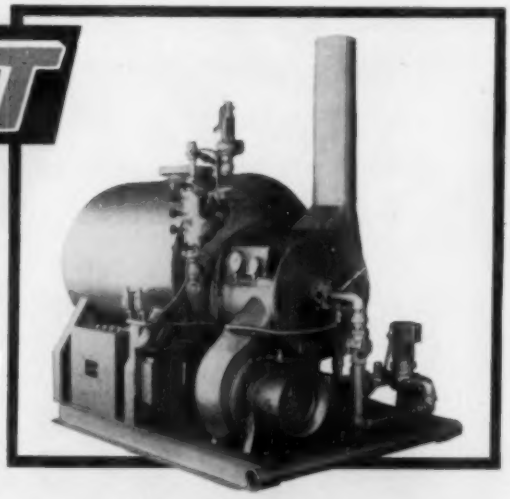
After cooling the bearing halves are mounted on the shaper and the faces machined for a parallel fit. They are then mounted on the drill press and by means of a vertical boring bar the oil rings are cut.

The two halves are then fastened together and placed in an old bearing housing in which a horizontal boring bar is driven through the bearing by a reduction drive and machines the babbit surfaces to original dimensions.

By J. P. CONNOLLY, JR., Asst. Supt., Plant Hagood, South Carolina Electric & Gas Co., Charleston, S. C.

TXT

Vapormatic Coil-N-Shell Steam Generator gives you more horsepower . . . more steam generating capacity in much *less* space



The Vapormatic Coil-N-Shell requires only a fraction of the space used by conventional boilers of comparable horsepower and generating capacity. Its capacity is 5 to 150 psig steam outlet pressure with a power range from 35 to 300 HP.

A forced circulation, water tube type steam generator, the Coil-N-Shell is completely unitized with all components assembled as an integral unit on a common base. It generates steam from a cold start in ten minutes and is ready for high temperature immediately.

The Vapormatic Coil-N-Shell is completely automatic. All sizes have modulating controls as standard equipment. Available with gas, oil and combination gas-oil fuel burning systems.

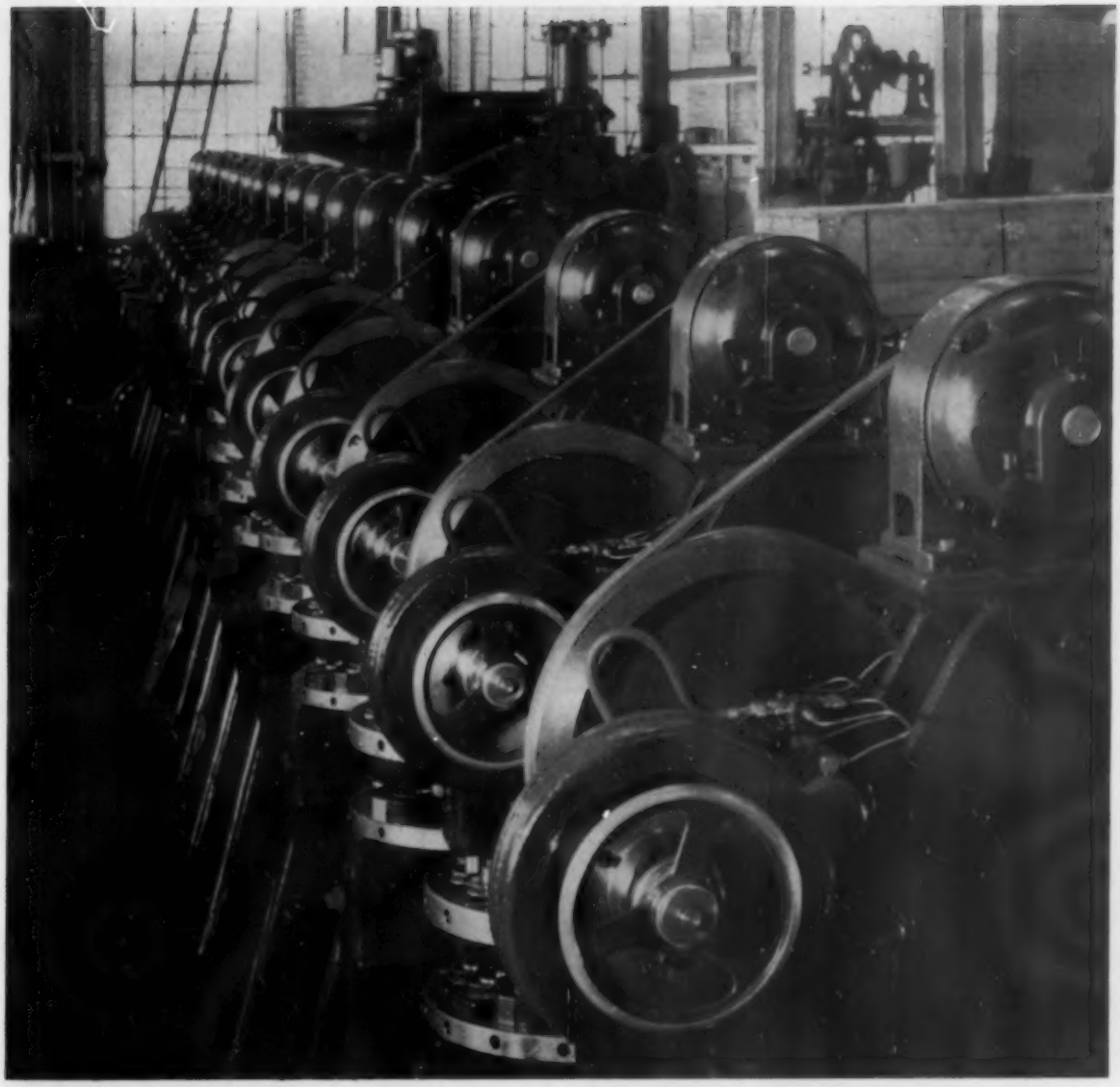
Complete specifications and operating data for all sizes are contained in Bulletin 582 CSA. Write for your copy now.

The Vapormatic Coil-N-Shell is quoted and shipped ready to fire up when feedwater, fuel, steam and electric lines are connected.

TXT TEXSTEAM Corporation

A SUBSIDIARY OF VAPOR HEATING CORPORATION

320 Hughes St. • P. O. Box 9127, Houston 11, Texas • Phone WA 6-6853



Higher speeds . . . higher efficiency . . . higher replacement cost

There was a time when a new gear or an odd part for machinery cost little more than the price of a few gallons of lubricating oil . . . but those days are gone forever. Today's power machinery is built for high speeds and higher efficiency. Parts are precision made, and replacements are sometimes prohibitively expensive.

The correct lubricant at the proper point in dependable form is a simple necessity in today's power machinery. The Standard Oil Company has made the servicing and supplying of such lubrication its business for over 70 years. The *first place popularity* of Standard Oil lubricants in the southern power industry has proved their dependable performance beyond doubt.

* * *

For lubrication that you can rely on for full protection against costly, unnecessary losses call in a Standard Oil lubrication representative today.

STANDARD OIL LUBRICANTS

STANDARD OIL COMPANY
(KENTUCKY)

"THIS LUBRICANT ENABLED US TO INCREASE PRODUCTION"

says—PITTSBURGH TUBE COMPANY

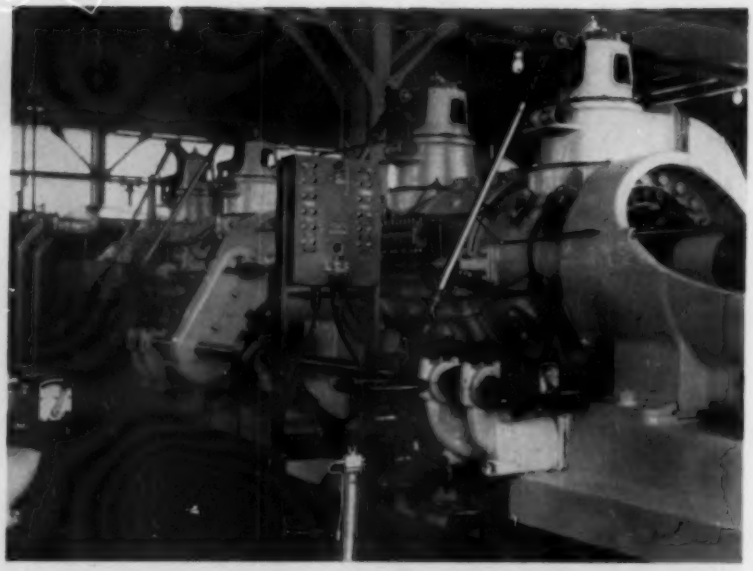
"Our 70,000 pound Draw Bench was designed to operate at a maximum of 80 feet per minute, full load. We decided to increase the drawing speed on lighter tubing to 100 and 104 feet per minute. This overloaded the Speed Reducer, however, causing it to overheat. We tried four different makes of oils without success before trying LUBRIPLATE A.P.G. 90. With LUBRIPLATE, we are able to pull heavier tubing than before at 104 feet per minute without the Reducer overheating."

R. S. Vorous
Maintenance Engineer

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose . . . LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Send for free "LUBRIPLATE DATA BOOK" . . . a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.



Supervisory panel on one of UGPL's 1000-hp horizontal compressor engines.

Case 51 — Louisiana Pipe Line Company

Plant Men Build Supervisory Panels

A CLOSE LOOK at results of a recent modernization project of United Gas Pipe Line Company's Compressor Station department is proof that you can't sell the old-timers short.

A number of United's stations have been in service more than 30 years and are still going strong, thanks in a large measure to development of the E & W Engine Supervisory Panel.

The supervisory panel is a simple, safe, sound and foolproof device that maintains constant vigil over the big horizontal type engines, heading off overheating and resultant costly damage and delay for repairs.

In effect, it is a many-handed oiler with a hand continuously on every main bearing in the plant and a finger always at the pulse of oil and water lines. It is a device with siren voice to warn of threatened trouble; and not only does it signal trouble, it describes the difficulty and points out its location.

In the case of a main bearing running too hot — if the trouble isn't or can't be corrected immediately, the panel automatically shuts the unit down to prevent the threatened damage.

All this is accomplished electronically. The device works by means of safety switches located at critical points on each of the compressor engines. Switches are activated by rising temperature, except in the lubricating oil system, which depends on a float to indicate oil flow stoppage.

For example, a main bearing is becoming overheated. The temperature indicating arm moves upscale to the predetermined danger point, making contact with the electric warning system. The siren sounds its warning. The man on duty might be at the far end of the long row of compressor units; but the supervisory panels, one for each unit, are so placed as to be visible from one end of the station to the other. A quick glance reveals that the big red light at the top of number four engine's panel is aglow.

First step is to silence the siren, then check the panel lights for location of the trouble. Two rows of red and green lights tell the

story; for when all is well, only the green lights burn. In our example, the red light comes on at the top left corner of the panel indicating that number four engine's left main bearing is in danger of overheating.

Close study and experimentation resulted in the simple but effective warning systems, and 35 of the panels have been built providing protective supervision of 33,800 horsepower of compressor station capacity. With safety as a chief consideration, they were designed for low-voltage operation. For simplicity and dependability they require only standard radio and television replacement parts, available everywhere; and all the panels and their parts are interchangeable from station to station.

Working with cooperation and assistance of United's Compressor Station department, the supervisory panels were designed and built by C. W. Epps, now retired, and C. L. Walters, both compressor station engineers with long records of service with United Gas Pipe Line Company.

Case 52 — Va. and Miss.

Non-Dusting Floors Help Production

A NON-DUSTING concrete floor can significantly aid production in Southern industries such as papermaking, textiles, food plants, etc.

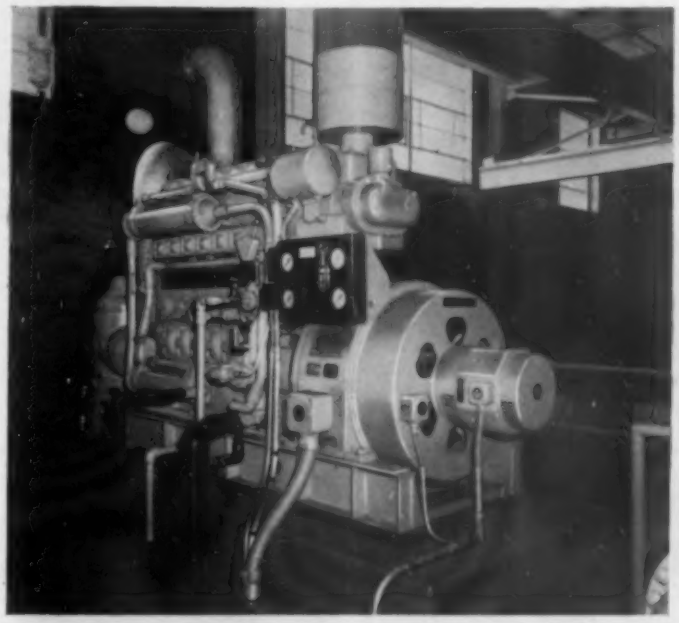
A floor that dusts, on the other hand, can send cement particles into machinery, the product, and workers' lungs. Under such conditions quality control is difficult to maintain.

Two Southern case histories show that non-dusting concrete floors can be achieved on more than a hit-and-miss basis. The trick seems to be in selecting the right surface and in hiring the right contractor to do the job.

One example is at the 123,000 sq ft Suffolk, Va., warehouse of Thomas J. Lipton, Inc., the tea company. Architect R. W. Naef,

Picture of O-P economy!

Ohio pumping station saves $300 a month using F-M Opposed-Piston standby diesel for both power generation and pumping



Compact, lightweight Model 38F5¼ O-P is rated 450 hp. at 1200 rpm., direct drives a 175-kw. F-M alternator and, through right-angle gears, an F-M Pomona Vertical Turbine Pump with 5.5 mgd. capacity at discharge pressure of 105 psi.

Electric power off the flywheel end, high-service pumping off the front—that's the standby job cut out for this Model 38F5¼ Fairbanks-Morse O-P Diesel in the Elyria, Ohio water works serving 60,000 people.

Called into service for 3 to 6 hours a day in the Spring of 1958, the O-P pumped water for $1.50 less per million gallons than purchased power—a $300 per month reduction, including savings on demand charges. Each Saturday the engine makes a test run as the sole high-service on the line.

Versatile as well as economical, the Model 38F5¼ O-P is also ideal for direct-driving other equipment off the rear, with front end of shaft driving an auxiliary generator, crusher, pump, etc. The O-P can be furnished for either diesel, dual-fuel, or spark-ignited operation, and is available as a complete packaged unit with all accessories attached to the frame. Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL, DUAL FUEL AND GAS ENGINES • LOCOMOTIVES • ELECTRIC MOTORS • GENERATORS
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Warehouse floor at Thomas J. Lipton, Suffolk, Va., laid by the Kalman Absorption Process has never dusted.

Floor at the F. C. Huyck & Sons mill in Aliceville, Ala., is used as a "table" upon which felt is spread out.

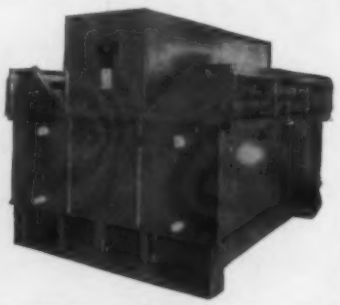
Jackson, Miss., specified an Absorption Process granolithic concrete topping to be laid by the Kalman Floor Company of New York.

Time has proved him right. The floor was laid in 1955: it has required no sealing, has not dusted, has acquired a polish with use, and is easy to clean. The company finds that detergents clean the floor without scrubbing being necessary.

The second example is a floor in the F. C. Huyck & Sons plant at Aliceville, Ala., producing papermakers' felts. Dust cannot be tolerated here. In addition, the floor must be absolutely smooth and non-staining because during manufacture the felt is laid upon the floor. Any rough surfaces would snag and injure the fibers. This would make an expensive, custom-made felt a reject or a costly repair problem, since as George L. Brown, Huyck's vice president of purchasing, puts it: "There are no seconds in our business. We can sell only first quality felts."

Thus when the Daniel Construction Co. built Huyck's plant at Aliceville, Ala., the entire manufacturing area of 200,000 sq ft was topped with Kalman's Absorption Process granolithic concrete because it would be dust free and easy to clean.

NIAGARA SECTIONAL *Aero* HEAT EXCHANGER gives close temperature control, saves you LABOR, Power, Water



- **Because the new design improves the heat transfer to the out-door air by evaporation.**
- **Because new features keep your equipment working for long life with "new plant" efficiency . . . always full capacity.**
- **Because you save 95% of cooling water cost.**

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You improve your quality of production by removing heat at the rate of input.

You save labor in upkeep. With full access to all interior parts and piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 7,000,000 to 18,000,000 Btu/hr. No other heat exchange method gives you so much saving in money and convenience.

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NIAGARA BLOWER COMPANY

Dept. SP-10, 405 Lexington Ave., New York 17, N.Y.

District Engineers in Principal Cities of U. S. and Canada

Case 53 — Louisiana

Preventive Maintenance Aids

WE HAVE UTILIZED our plant office reproduction machines to supply numerous simple printed forms for records of minor routine inspection of equipment. Operators make the inspections and the operating foreman then fills out the *Work Order* requests for indicated maintenance and forwards them to the office of the mechanical superintendent.

It is often difficult to get a regular, fairly frequent, visual inspection of operating equipment, but we believe our use of blank forms with each piece of equipment listed assists in attaining this objective.

Water cooling tower fan inspection is neglected in many plants. We have forty fans and our operator on the daylight shift shuts down six (6) fans daily the first five days of the week and five (5) each the other two days and rec-

ords anything out of line on a form entitled *Fan Inspection*. This form has the following headings: Fan No., Blades, Stack, Distribution Valve, Remarks, and line for Date and Operator's name.

A form entitled *Steam Traps and Bleeders* is used for weekly inspection of these items on distribution mains. Items are listed as to Size, Service, Location and Remarks. We have several miles of steam distribution mains, and the operator makes a note opposite each item listed on the form sheet, showing if it is OK or blowing, leaking, etc. He checks Expansion Joints on another form sheet on the same trip. This form has the following headings: Size, Pressure, Location, Travel - Inches (From Nameplate), Actual Travel This Date (Measured With Rule), Remarks.

Cold Weather Hazards are listed on a form sheet and each item is checked off when proper precautions have been completed. We do not have freezing weather very often, so it is more practical (and less costly) to block and bleed certain pipes, etc., for the usually short period. The list helps avoid costly freeze-ups. We have not had any maintenance in our department due to this cause in ten (10) years of operation and have added only a few items to our original survey list.

By B. H. MYLIUS
Cit-Con Oil Corp.
Lake Charles, La.

Case 54 — South Carolina

Non-Clogging Heat Exchanger

CAROLINA MILLS, INC. wanted to cut the cost of heating water for their dyeing, bleaching and finishing plant in Newton, North Carolina.

The general manager's interest was drawn to a heat reclaiming system that would take the heat out of their waste water and use that energy to preheat incoming fresh water. The system was in-

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Whether yours is a new installation or one that is now operating, IPCO Laboratories preventive maintenance program can save you money. Write today.

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stalled, but the heavy lint pollution from the cotton yarn and flannel products severely clogged the waste water tube entrances. Also, the waste water at the plant was much more corrosive than anticipated, and the carbon steel tubing became severely pitted.

The chief engineer later heard of a different kind of heat reclaiming equipment which was guaranteed not to clog or plug up. The rapidly increasing number of Ludell systems installed in textile wet-finishing plants was pointed out, emphasizing satisfactory handling of lint laden effluent.

Ludell engineers, with their representatives, the Kincaid Engineering Co., of Gastonia and Greensboro, surveyed the steam and hot water requirements at Carolina Mills and made their recommendations to the Chief Engineer. They drew up specifications for a system constructed of type 316 stainless steel on the waste water side and 304 stainless on the fresh water side, which would be guaranteed in writing to: 1) Not to clog or plug up, 2) Not to require manual cleaning, 3) Raise the temperature of 3000 gpm from 60 F to 130 F when supplied with 4500 gph of waste water at an average temperature of 140 F.

Ludell also designed into the system an automatic blending valve to produce 120 F water for the start up of the process operation.

The exchanger has continuous tubes and a design feature that permits lint and other solids to be completely back-flushed directly to the sewer. Once a solid enters a tube, it will pass completely through the tube.

The Ludell system was installed in January, 1958 and is giving the service specified. The corrections to the hot water heating cycle and the preheating of the incoming fresh water have eliminated peak loads which previously reduced the boiler pressure. The reclaimed heat has a value of over $8,000 a year.

Address Dept. S-10

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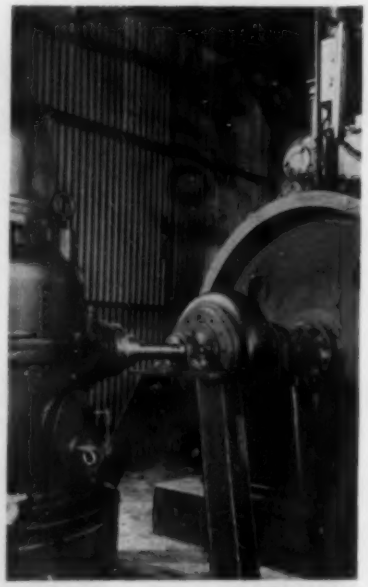
Case 55 — Texas

Rubber-Tire Coupling Cuts Pump Downtime

A NEW TYPE of shaft coupling has helped to reduce downtime and improve efficiency for the American Canals Company in Texas, which operates a system of pumping stations which deliver water to irrigation ditches at the rate of 32,000 gallons per minute.



Couplings of the universal joint type had to be lubricated periodically, and replaced about every two months during the pumping season, resulting in a heavy loss of pumpage. Ideally, the 175 hp gas engines and propeller pumps run without interruption during the six-month-long growing season.

Early last year, in an effort to reduce downtime for lubrication and replacement, the company purchased and installed a Para-flex Flexible Cushion Coupling introduced two years ago in the United States by Dodge Manufacturing Corporation. Besides offering exceptional capacity for handling angular and parallel misalignment, this rubber tire coupling has the ability to absorb torsional vibration and shock loads.

A 22-inch diameter coupling (PX-22) was installed as shown on shafts connecting the engine with pump. Misalignment was about

four degrees angular and ¼" parallel. The coupling worked perfectly all season, requiring no lubrication or other maintenance. The heart of the coupling is a tire with synthetic tension members bonded together in rubber. Twin flanges clamp the tire in place and allow it to flex under stress. The rubber-tire member can be replaced when worn without removing the flanges from the shafts.

Case 56 — Va. Furniture Plant

Exhaust Air Replaced by Make-Up Heaters

THE LARGE amounts of air exhausted from finishing areas in today's modern woodworking plants create many problems affecting both the manufacturing processes and employee comfort. The virtual forest of exhaust hoods on the roofs of such plants accentuates the problem.

In a typical woodworking plant, the exhaust systems and fans continuously carry out the heat, fumes, vapors, dust, etc., derived from process heat from drying ovens, fumes from paint spray booths, dust from sanding operations, etc.

In warm weather, there is seldom a problem because sufficient outside air is admitted through open doors and windows to replace exhausted air. In this case, all exhaust systems and fans perform at maximum efficiency, and a healthy, unpolluted atmosphere is maintained within the building.

But in cool weather, the problem becomes serious. With windows and doors closed tight, and with exhaust systems and fans working at peak, unless makeup air is provided, the building becomes "starved" for air and the capacity and effectiveness of all exhaust equipment is reduced. When this happens, heat, fumes and dust escape from the processes and tend to

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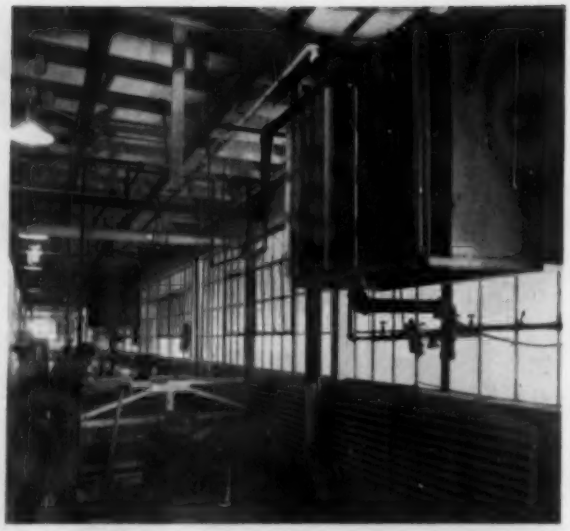

The west wall of the Basic-Witz Furniture Industries, Inc., plant at Staunton, Virginia, contains three Fresh Air Supply (FAS) units, to furnish fresh, heated outside air to replace 100,000 cfm of air exhausted from finishing room.

accumulate in the building, adversely affecting the quality of the product and impairing the health and efficiency of the workers.

In seeking a solution to this problem, and after a thorough survey of several possible solutions, the Basic-Witz Furniture Industries, Inc., at its Staunton, Virginia plant, selected a fresh air supply system recommended by the L. J. Wing Mfg. Co. The Wing system, based on the installation of six fresh air supply horizontal flow-type heaters with vertical vanes, effectively balances the exhausted air by bringing in an equal amount of clean, heated outside air.

Basic-Witz, a leading manufacturer of bedroom and dining room furniture, utilizes in its straight-line production system some 3,200 feet of moving conveyor lines which move the pieces of furniture through the finishing and high-temperature drying operations.

The heart of the exhaust problem at Basic-Witz was in the 30,000-square-foot finishing area with its 12-foot ceiling. Here 29 axial flow duct fans exhaust some 100,000 cfm of dust- and fume-laden air from the 12 paint spray booths and the large drying ovens which occupy the entire center of the area. To add to these problems, large quantities of cold air were being drawn up from the basement through open elevator and conveyor shafts. A paint spray booth, rubbing and packing operations are located in the basement where three additional exhaust fans are installed.

Adjoining the main finishing room is a second finishing room in which are located sanding operations and three additional paint spray booths. Four additional exhaust fans are installed here.

To maintain the production flow, two sets of doors on the north wall between the rooms, each 12 feet wide and 10 feet high, are open at all times. This allowed dust- and fume-laden air to be drawn into the main finishing room through these doors, under considerable velocity, replacing the air being exhausted from the main finishing room.

In cold weather, with all exhaust systems and fans running, and with no makeup air system present, this created a slight vacuum or minus pressure, within the finishing room.

This vacuum reduced the efficiency of the exhaust system as it took away from the air volume

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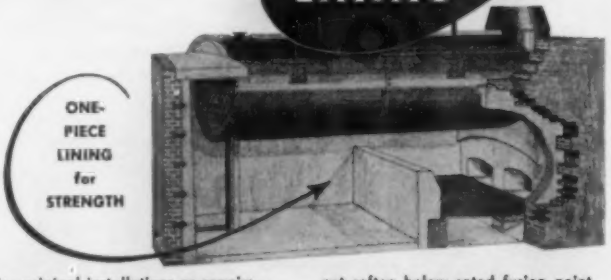

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- McBurney Stoker & Equip. Co., Atlanta, Ga.
- Brown-Rogers-Dixon Co., Spartanburg, S. C.
- Way Fire Brick Co., Churchland, Va.
- Muse, Inc., Johnson City, Tenn.

and the velocity of the air to be exhausted. At the same time, this negative pressure in the room caused a greater infiltration of cold air. This tended to create cold spots and to leave wall areas cold.

The six Fresh Air Supply (FAS) unit heaters supplied by L. J. Wing, were installed as follows: two on the east wall, one on the south wall, and the remaining three on the west wall near the conveyor and elevator shaft openings. These units each introduce 12,000 cfm of fresh heated outside air into the finishing room; an amount of air equal to that exhausted by all of the exhaust equipment and at just the temperature desired. Each of these units is mounted in a window opening seven feet above the floor and is fitted with an inlet hood.

One unique feature of these units is the series of face and by-pass dampers which automatically regulate the discharge and temperature by controlling the amount of air passing over the steam coils. This permits the Wing unit to be constantly under full steam pressure and prevents any danger of freezing as in some systems, where temperature is controlled by modulating the supply of steam.

In coldest weather, the dampers are completely closed on the by-passes and all of the outside air enters through the heating elements. As the outside temperature rises, more and more of the fresh air enters through the by-passes and a lesser amount through the heating coils. On warmer days the air is delivered through the by-passes only. Two synchronized, spring-return damper motors, controlled by an airstream thermostat, automatically position the dampers to control the air temperature.

When no fresh air supply is needed and the fan motor is stopped, the spring-return feature of the damper control motors functions immediately to close both sets of dampers, thus preventing warm air flowing from the building to the outside, or cold air entering the building through the unit. Separate, motorized shut-off dampers are not required.

In summer, the steam is turned off and the FAS units are operated to bring cool, fresh air into the building for employee comfort.

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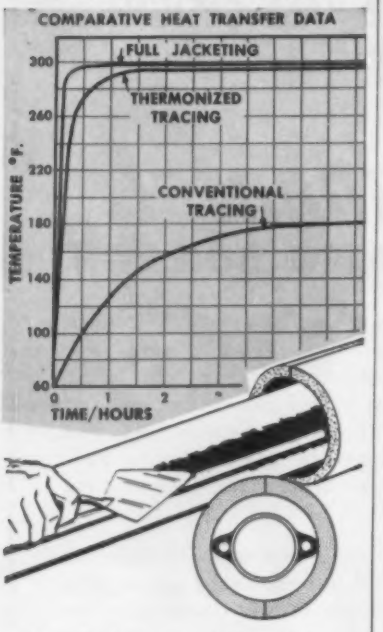

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Case 57 — Houston, Texas

Outdoor Construction Cuts Initial Cost

SUBSTANTIAL savings in initial installation costs have been the keystone in the rapid development of outdoor power stations throughout the South and Southwest. Houston Power & Lighting has recently placed in service another outdoor unit, adding to a long string of such installations. In all of these, a very substantial saving over indoor type construction was realized, according to the utility.

Unit No. 1 in the North Houston plant is a 66-mw unit, featuring an inductor-alternator excitation system. Installation of the 220-mw Unit No. 2 is now being completed. It is one of the largest outdoor units in the country and was also supplied by Allis-Chalmers. The new unit features a tandem-compound, triple-flow turbine and a fully supercharged generator.

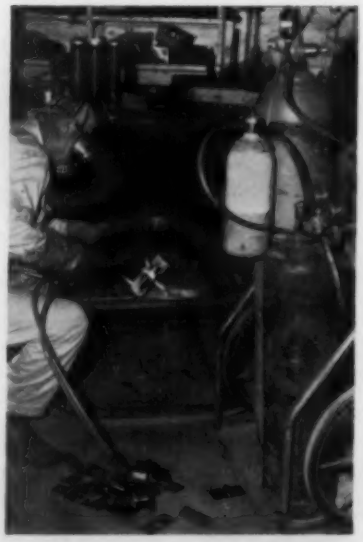
Case 58 — Texas

Welding Problem Solved with Vapor Entrained Flux

THE PROBLEM sounded simple enough — to fabricate and chrome plate 3,000 special brackets to hold emergency storm shutters for a chain of 70 stores in the South . . . stores that had been battered by hurricanes.

John Paul Hefner, the Houston firm's chief utility welder and fabricator, figured he'd make the brackets in the company shop rather than turn them over to a job welding shop. It was no trick at all to cut the parts and weld steel tubing to the 1½" x 3" steel plates.

He soon found, however, that using a flux coated rod applied by



John Paul Hefner, Houston, uses automatic fluxing system to feed vapor entrained flux to the job. Result: faster welds, cleaner welds.

touch made the job a slow one. More serious, he was not getting welds clean enough for plating, and this meant extra grinding and cleaning before plating. So, Hefner called in Ken Martin of Alloy Weld Supply Company, Houston.

Martin, experienced in the selection of the right rod and flux for welding and brazing jobs, recommended an automatic fluxing system made by All-State Welding Alloys Company.

In this system the vapor entrained flux is fed in controlled amounts with acetylene through the flame of the torch. It has excellent cleaning qualities and results in a smooth weld deposit. Martin recommended All-State's No. 11 nickel silver brazing alloy, which flows at low heat and with great capillary action.

The combination proved to be the answer to the problem. Production was greatly speeded and the resulting welds were so clean that the brackets were ready for chrome plating without further work.

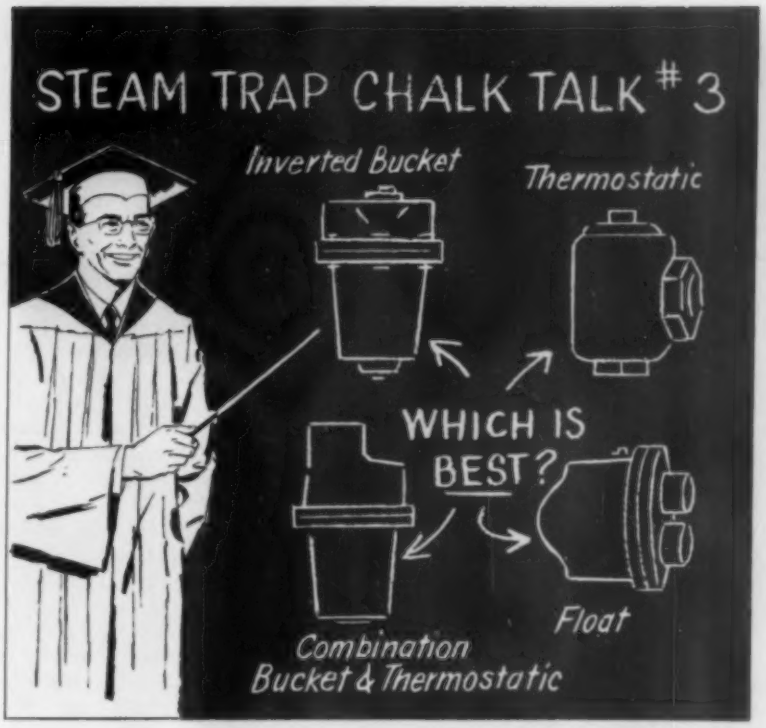
More important than the savings on this job, John Paul Hefner finds that production has exactly doubled on all his acetylene jobs, from steel to bronze.

Case 59 — Fort Worth

General Area Maintenance

IN MOST LARGE organizations the Plant Engineering or Maintenance department is beset with constant requests for "housekeeping" type maintenance. This includes minor repair of partitions, bins and shelving, fences and guard rails, chip shields, vent pipes and ducts, etc. Also, cleanup of former jobs — removal of left over pipes, conduits and wires, anchor bolts or sleeves, fill in of minor holes in floor and walls. Most prevalent of all are requests for cleaning and painting.

Such requests are handled in several ways in different organizations — on a "first come — first serve" basis, on a "grease the squeaky wheel" basis, by saving



Is one trap design better than another?

● The steam trap user is often confused by the fact that there are four different designs of traps on the market. Is one better than another, and if so, which one should he use?

Actually, each design of trap has its place, *depending upon the application*. For example, thermostatic traps are preferred for chemical, petroleum and other outdoor applications because they cannot freeze. However, they do not compare in efficiency with inverted bucket traps for normal inside use. Where fast heating up is required, the combination bucket and thermostatic trap permits steam units to reach maximum heat 2½ times faster. For continuous service, float traps are best.

For sound recommendations, ask Anderson. Manufacturing a complete line of traps, in all designs, they give unbiased counsel. Their engineering catalog, "How to Select Steam Traps and Other Fluid Specialties" contains hundreds of worthwhile recommendations. Mail coupon for your copy today.

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them until the problem is too big to be ignored, or by a planned program. Obviously, if this type of work is worth doing at all, a planned program must be set up. The fact, often ignored or hidden, that it will require people and money and is not a "spare time" activity must be recognized by management.

At Convair (Fort Worth) Division of General Dynamics Corporation this problem has been met, with excellent results, by the establishment of a "general area maintenance crew."

Normal maintenance at this plant is handled by mixed trade crews assigned to specific areas, with complete facilities for their usual responsibilities located in their respective areas. The work of these crews, however, is limited to preventive and breakdown maintenance of production machinery and equipment and building services. It does not include the type of work described above.

The "general area maintenance crew" consists of a 15 man mixed trade crew of painters, carpenters, mechanics, electricians, plumbers, and laborers led by a foreman. The exact makeup of the crew varies from time to time according to need. The work of this crew was laid out and scheduled to cover the main plant, including both offices and factory on a two year schedule. With many additions to the facility, it now appears that a complete cycle will require 2½ to 3 years.

Before this crew enters an area, the foreman coordinates its work with supervision in the area to avoid friction or loss of time. Work performed includes everything needed from floor to ceiling, leaving the area very close to a "like new" condition.

In scheduling this type of work, it is necessary to be both definite and flexible, keeping a little capability in reserve to take care of unusual conditions and emergencies without missing dates too much.

One of the biggest advantages is being able to tell the various department managers or supervisors when their areas will be taken care of. This has led to a virtual stopping of special requests for this type service. Also, the enthusiastic acceptance of this crew has engendered pride of workmanship in its members, further enhancing its value. The result, after approximately 18 months operation, is a distinctly cleaner and better kept shop with improved employee morale and efficiency.

By F. C. CLAYTON, Chief Plant Engineer, Convair, Fort Worth, Texas.

Case 60 — Asheville, N. C.

Build-Lease Construction for Kearfott's Asheville Plant

THE KEARFOTT Company, Inc., nationally known manufacturer of electronic parts, recently verified a decision they made five years ago when they erected a new plant in the Asheville, North Carolina, area.

On June 18 Kearfott held the official opening of a new plant addition which more than tripled the original 26,000 square feet of floor space. The plant was specifically designed for the manufacture of synchros, servo motors and other rotary electrical components.

Construction of the new addition was done on a build-lease basis by R. S. Noonan, Inc., Contractors and Engineers of York, Pennsylvania. They're one of the few firms in the country specializing in this method of construction. Kearfott's decision to build in this manner may portend a trend in the South.

Proponents of the build-lease method expect it to grow in popularity because:

1) It frees money which would be tied up in real estate for use as working capital. Since working capital can be turned over from an average of 2½ to 5 times a year, this can be a big and profitable item.

2) The amount paid by the tenant as rent is completely deductible for tax purposes. This

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contrasts favorably with the nominal amount allowable for depreciation.

3) With the removal of a fixed asset from the company's books, their current ratio of assets to liabilities is improved by the addition of working capital.

4) Industry can expand much more rapidly under this method of construction since there's no waiting for an accumulation of reserves before building.

Although Noonan's services include site evaluation and selection, and complete financing, these features were not employed in their dealings with the Kearfott Corporation.

The Asheville area had been chosen by Kearfott five years ago after an intensive six months investigation of possible plant sites. The choice finally was between locations in New England and the South.

Kearfott felt that the ample labor supply, lower land and construction costs, and more favorable shipping conditions, (the Company ships by truck) of the Asheville area made it the most desirable location. They've never regretted their decision.

The plant now employs about 750 people on two shifts. Except for initial supervisory help brought from their Northern plants, all of the workers came from North Carolina. Company officials feel that the extremely small turnover, and the loyalty and enthusiasm of the workers more than justify the expense of the training of them for special tasks.

Strangely enough in so technical an operation, there are just five engineers at the Asheville plant. Effective communication between home office and the plant is maintained by a direct telephone wire and a frequent interchange of officials. Thus, most of the technical planning is accomplished in northern New Jersey, while production is carried out in North Carolina at lower costs.

It's pretty obvious that this has proved to be a profitable way for Kearfott to do business.

Write the Editors for more information on Case Studies.

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NEW Catalogs & Bulletins

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MAINTENANCE—TOOLS EQUIPMENT & METHODS

1—Neoprene Rubber-Coating—Charcote, a waterproof protective barrier against rust and corrosion described in 4 p bulletin. Offers plant engineer outstanding protection against corrosive fumes, salt spray, abrasion and moisture. — CHARLESTON RUBBER CO.

2—Electrical Maintenance — New contract service (for Southeast only) inspects and tests motors, generators, gearing, control & distribution systems, etc., at a cost less than 1% of value of equipment. — Atlanta office of WESTINGHOUSE ELECTRIC.

4—Spotcheck—You can save time, money and labor in finding cracked parts quickly and easily with this $36.00 Spotcheck Kit — a dye penetrant inspection technique. Bulletin describes complete fire-safe materials and kit.—MAGNAFLUX CORP.

5—Metal Cutters — Bulletin 655 shows actual cost figures on various metal cutting jobs (bolt, rod, wire, chain, etc.), by using hand and power-operated cutters. — H. K. PORTER INC.

17—Mechanical Packings — 32 p Cat. PC-103 describes a variety of packings & gaskets, including self-lubricating, sheet and molded packings, etc. Includes application charts and price information. — GREENE, TWEED & CO.

22—Lubricator Alert — Data sheet describes lubricator flow switch that indicates positive flow at terminal points on any force feed lubricator system. Easily installed on any existing application. Indicates lack of flow to the point of injection. — MANZEL.

29—Belting Repairs — Two bulletins "How to Properly Join Belts" and "Belt Fastener Selection Chart" offer service help on conveyor, elevator and transmission belting. — CRESCENT BELT FASTENER CO.

33—Air Compressor Rod Packing — Catalog 56 shows how "Compressor" No. 760 stays flexible under intense dry heat and protects rods from premature wear. — THE BELMONT PACKING & RUBBER CO.

45—Correct Lubrication — "Lubriplate Data Book" shows importance of providing and maintaining proper and economical maintenance of all types of plant machinery through adequate lubrication. — FISKE BROTHERS REFINING CO.

53—Steam Line Treatment — Folder describes alkaline IPCO S-L-T. Used in boiler water, it will volatilize and travel with steam to return lines. Prevents costly repairs and provides insurance against replacing pipe and fittings. — IPCO LABORATORIES, INC.

64—Anti-Corrosive Paints — Bulletin "The Application of Subox and Subalox Paints" — Gives the story of a complete paint system for weather, moisture and alkali protection, with details as to application.—SUBOX, INC.

70—Multi-Purpose Grease — Bulletins describe new single product Gulfcrown grease (4 consistencies) that does the work of many — simplifies application and avoids errors, reduces inventory and cuts lubrication costs; grease gun or centralized system application. — GULF OIL CORPORATION.

78—Control Heat & Glare — New folder tells how Sun-X Glass Tinting (transparent alkyd-based liquid plastic by duPont) is applied directly to existing glass by flow process without spray or splatter. Bonds tightly. Wash in usual manner. — AMERICAN GLASS TINTING CORP.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

122—Industrial Fans — Bulletin 702 covers Type XL fans for air and material handling. Volumes to 130,000 cfm pressures to 18" SP. Catalog 855 describes Pressure Fans. Volumes to 12,000 cfm, 10" to 50" SP. — CLARAGE FAN CO.

132—Glassed Centrifugal Pumps — 12 page Bulletin 725.2 describes line of glassed pumps for handling corrosive acids and alkalies. Every part of pump exposed to liquid has a tough glass surface. Specification, ratings, dimensions. — GOULDS PUMPS, INC.

135—Heat Exchanger — Bulletin 132 shows how sectional Aero unit gives close temperature control, saves labor, power, and water; design improves heat transfer to outdoor air by evaporation; 7,000,000 to 18,000,000 Btu/hr capacity range. —NIAGARA BLOWER COMPANY.

143—Chemical Feeders — 36 p Bul. 1136 describes metering pumps — types, construction, displacement and operating pressures. Gives handling recommendations for chemicals, acids, etc., and volumetric conversion tables. — MANZEL.

160—Boiler Feed Pumps—12 p Bulletin 122 describes and illustrates the type BFI high pressure pumps. Design features, service ratings and engineering data included.—PACIFIC PUMPS, INC.

189—Air Traps — Bulletin 289 describes ball float traps for draining water from air, gas or steam lines, or for draining light liquids from gas under pressure. Physical and selection data, prices, etc. — ARMSTRONG MACHINE WORKS.

INSTRUMENTS—METERS CONTROLS—REGULATORS

201—Valves & Gages — Handy guide No. 36 gives data & prices on valves, liquid-level gages & accessories for process and power industries. — PENBERTHY MFG. CO.

205—Draft Gages — Bulletins describe inclined, vertical tube, air filter gages, straight line and dial pointer type, minified draft and receiver type gages, velocity gages and pitot tubes, gas analyzers and steam calorimeters. — ELLISON DRAFT GAGE CO.

206—Process "Indicator" — Catl. 100 B shows how you can have maximum info on all process variables with Panalarm annunciators. Trouble

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Bulletins (Cont.)

anywhere is signalled instantly — before it can grow big and expensive. — PANELLIT, INC.

209—Liquid Level Controls—Catalog describes controls for almost any liquid, at any pressure, at any temperature. Can be furnished in top-mounting, side-mounting styles, or as external float cage units. Almost unlimited application. — MAGNETROL, INC.

212—Automatic Temperature Control — Data sheets describe versatile automatic indicating temperature control, offering many sequence combinations—step-heating, heating and cooling, wide limit control, or temperature control plus operation of signal devices.—SARCO COMPANY, INC.

222—Pressure Regulators — Catalog No. 77 illustrates and describes application, operation and specifications for a complete line of reducing, back-pressure and pump-pressure regulators.—MASON-NEILAN.

223—Combustion Control — Bulletin 1023, 24 pages — Contains actual installation photos and diagrammatics of Bailey air operated combustion control for oil and gas fired boilers; two pages of chart records and six page list of typical installations. — BAILEY METER COMPANY.

228—Fuel Cut-Outs & Water Level Alarms — Brochure D2 — Electrode type equipment for installation on water columns to provide fuel cut-out, high and low water level alarms and pump cut on and off. For pressures to 2500 psi. — RELIANCE GAUGE COLUMN CO.

235—Liquid Levels — Bulletin 532 describes indicator which gives a reliable, automatic reading of storage tank contents. 20" dial in 3 x 10" case saves panel space. No outside power source needed; can be located up to 250 ft from tank. — THE LIQUIDOMETER CORP.

248—Pump Pressure Regulators — Bulletin 5306 describes constant and differential pump pressure regulators for steam turbines, reciprocating and motor driven pumps. Complete sizing and capacity information as well as construction features. — LESLIE CO.

259—Steam-Air Flow Meter — Product Specification M61-1 describes operation, construction and installation requirements of boiler meter used as a combustion guide for optimum firing of all types of fuels. — BAILEY METER CO.

281—Control Valve — 8 p Bul. J-170 describes sliding gate and plate control valves available. Includes engineering data, cutaway drawings, features, application information, dimensional drawings, flow capacities, rating charts, flow curve and sample specifications. — OPW-JORDAN.

287—Color-Port Water Gage — Bulletin WG-1814 describes the new gage for high pressure boilers (up to 3300 psi). Gives full details on design and operation and shows how it gives greater visibility and greatly reduced maintenance requirements. —YARNALL-WARING COMPANY.

PLANT CONSTRUCTION—WELDING EQUIPMENT—SPECIALTIES

300—Fact Folders — 23 up-to-date industrial fact-file folders on aluminum, steel, copper, stainless steel, insulation, roofing and other industrial supplies immediately available from 9 Southern warehouses. — REYNOLDS ALUMINUM SUPPLY CO.

301—Vacuum Cleaning Systems — How portable and stationary systems cut costs and increase plant efficiency shown in Booklet P8 and AB-100. Eight heavy duty units (1½ to 15 hp) for cleaning hard to get at areas, reclaiming valuable materials, etc. — U. S. HOFFMAN MACH. CORP.

304—Backing Rings — Bulletin 56-2 describes rings designed for fast economical fit-up in piping, tubing, fittings and valves. Shows how rings assure uniform complete-penetration welds and ease of handling in both shop and field. Carbon steel, wrought iron, chrome alloys, stainless, aluminum and copper.—ROBVON BACKING RING COMPANY.

310—Incinerator — Metal cased, insulated, refractory lined incinerators for industrial and commercial use. City smoke code approved. Fast, economical installation — any size and capacity. — NORTH STATE PYROPHYLLITE CO.

315—Pressure Vessels — Catalog 100 discusses your plate fabrication problems and shows how company custom-fabricates hot water storage heaters, tanks, air receivers, blow-off tanks, etc. Corrosion resistant linings and materials featured. Suggested specifications and other valuable technical data given. — J. J. FINNIGAN CO.

317—Drier Compressed Air — Bulletin 130 shows how Aero After Cooler cools compressed air or gas below temperature of surrounding atmosphere; no further condensation in your air lines. Installed outdoors. Saves cooling water. Gives better operation of air-operated tools, etc. —NIAGARA BLOWER COMPANY.

319—Portable Band Saw — Bulletin describes the Kalamobile, a portable metal-cutting band saw. Has rubber-tired 12" wheels and telescoping handles. Capacity 6" rounds - 10" flat. — Machine Tool Div., KALAMAZOO TANK AND SILO CO.

322—Heat Transfer Cements — Engineering Data Book 502 includes calculations, estimating and installation procedures on properties and uses of Thermon heat transfer cements. Contains complete list of Southern engineering representatives. — THERMON MANUFACTURING COMPANY.

323—Mercury Vapor Fixture — Industrial color corrected units described in Bulletin 401. "Stabilux Socket" secures bulb end of lamp, eliminating lamp rupture and breakage from vibration. — WIDE-LITE CORP.

326—Beam-Type Guardrail—Manual FB-3456 describes how Flex-Beam Guardrail protects danger spots along roads, highways, bridges, and in industrial plant locations. Installation photos, drawings, reference data, dimensions and physical properties. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

328—Wrought Iron O. D. Piping — 8 p bulletin highlights wrought iron's durability in large O. D. applications. Includes specific water and sewage service records, recent installations, and an account of the famous Virginia City pipe line. — A. M. BYERS CO.

330—Elevated Water Storage — 4-color catalog describes the Aquatore — a new elevated water tank design with capacities from 300,000 to 3,000,000 gallons. Many design advantages including no struts or tie-rods. — GRAVER TANK & MFG. CO.

334—Storage Racks — Bulletin 17SP shows how Rackmaster Fittings cut rack-building time as much as 60% by eliminating threading and welding. Pipe 100% salvageable. — THE HOLLAENDER MFG. CO.

348—Building Drainage — 64 p bulletin describes the advantages of 4-D wrought iron for soil, waste, vent and downspout piping. Includes sections on corrosive conditions, comparative service, costs, Durham systems, and photographic surveys on vent corrosion. — A. M. BYERS CO.

355—Steam-Jet Cleaners — Bulletins JC-100 and SG-200 describe

Bulletins (Cont.)

steam-jet cleaners. Series "R" Speedylectric generates steam to 250 psig and temperatures to 405 F. Larger cleaners available. — PANTEX MFG. CORP.

356—Lightweight Steel Sheet Piling — Catalog lists specifications and uses of lightweight steel sheet piling for protection of light-load excavations. — L. B. FOSTER CO.

363—Magnetic Separators — Catalog 910 covers wet concentration and magnetic recovery. Various types and sizes shown as well as typical installations and machines. — JEFFREY MFG. CO.

386—Rigid Frame Building — 8 page bulletin "Dixisteel Rigid Frame Buildings" — low cost, flexibility of design, durability, and minimum maintenance; also triangular or bow-string truss all-steel roof systems; fabricated for rapid erection. — ATLANTIC STEEL COMPANY.

PIPING—VALVES—FITTINGS STEAM SPECIALTIES—TRAPS

401—Steam Traps — Bulletin 775 gives price, dimension and capacity data on Open Float and Thermostatic Steam Traps for trouble-free heating service.—ARMSTRONG MACHINE WORKS.

402—Forged Steel Valves — General Purpose Valves, Supplement No. 1 to Catalog F-9, covers gate, globe and angle valves. ½" through 2" sizes, for 150-800 pound service. Featuring 13% chrome stainless steel trim with hard facings. — HENRY VOGT MACHINE CO.

403—Valve Operators—Folder shows how re-designed sprocket rim makes any valve readily accessible from the floor. Simplifies pipe layouts, prevents accidents, fits all valve wheels. — BABBITT STEAM SPECIALTY CO.

407—Piping Materials — Bulletin reports on intensive investigation into problem of main steam piping materials and gives data on stress rupture characteristics of Types 316 and 347 stainless steel piping adjacent to welded joints. — PITTSBURGH PIPING AND EQUIPMENT COMPANY.

409—Lubricated Plug Valves—Catalog PV-4 covers operational features. Quarter-turn to open or close; lubricant grooves provide positive seal when valve is closed; when open, seating surfaces not exposed. — THE WM. POWELL COMPANY.

412—Power Piping — 8 p brochure describes latest computer methods of analyzing power piping designs. — THE M. W. KELLOGG CO.

438—Steam Traps — 8 p Bulletin T-1742(57) illustrates and describes high capacity impulse steam traps. Includes capacities, dimensions, weights, and prices. — YARNALL-WARING CO.

443—PVC Fittings & Flanges — Corrosion resistant polyvinyl chloride pipe fittings & flanges covered in 12 p catalog, featuring characteristics, advantages, limitations, operating pressures, temperatures, field tests, etc.—GRINNELL COMPANY, INC.

465—Water Hammer — Cause, effect and control covered in Bulletin 851. — THE WILLIAMS GAUGE CO., INC.

478—Trap Selection—Booklet "How to Select Steam Traps and Other Fluid Specialties" gives valuable tips on which of the four basic types of traps — inverted bucket, thermostatic, combination or float — to use for any installation.—V. D. ANDERSON CO.

479—Multiport Drainers — Publication 5201 containing 8 pages describes units for removing large quantities of condensate under vacuum or pressures, as from evaporators, heaters, separators, coils, or steam lines (up to 200 psi maximum). Lists discharge capacities, shows features and typical installations. — COCHRANE CORPORATION.

BOILERS—STOKERS TURBINES—BURNERS

501—Package Boiler—New compact, low cost package unit (oil or gas fired) for small space requirements is described in Bulletin DK-1. Pressures to 325 psi, steam capacities to 45,000 lb/hr. — E. KEELER CO.

504—Steam Generators — Bulletin AXY-1 describes auxiliary equipment and design features of the Amesteam Generator for sizes 10 through 600 hp and illustrates how this integrated design reduces cost and increases life and reliability. — AMES IRON WORKS, INC.

505—Refractories — Paco High Heat Duty and Super Duty Plastic Refractories. Fire brick, high temperature cement, castables. Installation and engineering service. Free estimates and inspection. — NORTH STATE PYROPHYLLITE CO.

506—Package Boilers — Practical construction with Continental two pass design described in Bulletin BE100. Units range in size from 20 to 600 hp; 15 to 250 pressures burning oil, gas or combination. — BOILER ENGINEERING & SUPPLY.

513—Power Plant Equipment — 12 page booklet No. 1022-B gives details on combustion and boiler feedwater control, pressure reducing, desuperheating and automatic soot blowing — retractable and rotary. — COPES-VULCAN DIV.

521—Gas Tempering — How you can burn the most economical fuel available (coal, oil or gas) described in Bul. G-96. Cuts overall plant costs since smaller size unit requires smaller building per kw, etc. — THE BABCOCK & WILCOX CO.

531—Fuel Oil Treatment — Data sheet describes how Mogul treatment disintegrates, dissolves and disperses sludge in fuel oil storage tanks and equipment. Through sludge dispersal, maximum vaporization and combustion are possible. — THE NORTH AMERICAN MOGUL PRODUCTS COMPANY.

539—Industrial Burners — How to keep heating costs low with Hev-E-Oil commercial-industrial burners described in literature SPI-859. Models from 5 to 150 gph; automatic, electronic controls; Hev-E-Duty power gas burners and combination gas/oil burners from 720,000 to 21,000,000 Btu. — INDUSTRIAL COMBUSTION, INC.

542—Underfeed Stoker — Illustrated Cat. 401 gives complete data on double retort underfeed stoker built for heavy duty service in intermediate size range for boilers of 20,000 lb to 34,000 lb of steam/hr capacity. — DETROIT STOKER CO.

547—Gas and/or Oil Burners — Bulletin B1 describes large or small, single or dual fuel, packaged or field assembled, atmospheric or forced draft; electronics of all types; competent sales and service.—WEBSTER ENGINEERING CO.

551—Packaged Water Tube Boilers — Complete data and dimensions for boilers ranging from 8,000 to 50,000 lb/hr, firing oil or gas or both, described in 12 p Catalog 111-D. — SUPERIOR COMBUSTION INDUSTRIES, INC.

557—Coal — Current brochure on "Prescription Coals." — A. T. MASSEY COAL CO., INC.

561—Ash Removal — Bulletins S-57 & S-57A show how costs can be reduced with pneumatic and hydraulic ash conveyors. High operating efficiency based on tons of ash handled per pound of steam used. — NATIONAL CONVEYORS CO., INC.

574—Packaged Generator — Bulletin 582 describes Vapormatic Coil-N-Shell Steam Generator for service requirements of 5 to 150 psig. Gives operation features and specification data. Available with gas, oil, and combination gas/oil fuel systems. — TEXSTEAM CORP.

ENGINES—DRIVES POWER TRANSMISSION MATERIAL HANDLING

601—Crane Runway Rails — Catalog gives information on crane rails, angle bars, crane stops, rail clips, hook and anchor bolts, bearing plates. Also specifications on various sizes of crane rail clips and explains how to order rails. — L. B. FOSTER CO.

602—Pneumatic Ash Conveyors — Bulletin S57-A describes pneumatic ash conveyors for rugged, wear-resistant pipe and fittings that provide lower maintenance cost per ton of ash covered. — NATIONAL CONVEYORS CO. INC.

610—Flexible Couplings — All metal couplings described in Catalog 51A have no wearing parts; offer freedom from backlash, torsional rigidity; free end float; smooth continuous drive; and visual inspection in operation. — THOMAS FLEXIBLE COUPLING CO.

614—Vertical Transportation — Elevator Catalog — Describes and illustrates details of passenger and freight elevators, escalators, dumbwaiters, and modernization and maintenance equipment for use in industrial, utility and service plants. — OTIS ELEVATOR CO.

618—Casters & Wheels — Featuring "Lockweld" steel casters without a king-pin, Cat. C-57 describes full line of industrial wheels manufactured and distributed from Rome, Ga. plant. — THE FAIRBANKS CO.

630—Mechanical Vibrating Conveyors — Catalog 890 gives information on conveyability and density of typical solid materials and provides data on how to "Do It Yourself" to get required length. — JEFFREY MFG. CO.

634—Gear Requirements — 8p catalog describes equipment and facilities available to meet your most exacting gear requirements. South's leading gear, gear products, and power transmission equipment manufacturer. — VIRGINIA GEAR & MACHINE CORP.

704—Water Conditioning—Brochure describes company's engineering services — zeolite water softeners, filters and purifiers, modernized and rebuilt water softeners, aerators and degasitors and process and boiler water conditioning. — SOUTHERN WATER CONDITIONING, INC.

708—Zeolite Softener — 8 p Bulletin 4530-A discusses the hydrogen zeolite process — its advantages, chemistry and neutralizing variations. — COCHRANE CORP.

710—Scale Remover—Bulletin shows how Anco Scale Remover quickly eliminates scale in boilers, water lines, refrigeration and air conditioning systems — ANDERSON CHEMICAL COMPANY.

715—Amine Treatment—Return line corrosion is a critical problem in maintaining economical, efficient power plant operation. Bulletin CP-100 shows how amine treatment is an easy, effective and economical way to eliminate pipe corrosion problems. — THE BIRD ARCHER COMPANY.

716—Dust Collection — Whether nuisance elimination or process material recovery, check on Whirlex Dust Collector Units. Engineering data available. — THE FLY ASH ARRESTOR CORP.

723—Fly Ash Collection — Catalog 103 tells you how "Double Eddy" goes to work to increase boiler fly ash collection. Buell Cyclones will not clog or plug even with loadings up to one pound of ash per cu ft of gas.—BUELL ENGINEERING COMPANY, INC.

742—Water Treating Equipment Guide — Bulletin 615 illustrates and describes the newest in manual and automatic zeolite water softeners, demineralizers & deionizers, dealkalizers, etc. Spray and tray type deaerating heaters and water treating chemicals also included. — ELGIN SOFTENER CORP.

748—Stop Fungal Decay — Bulletin MT-58 describes company's preservative wood treatment for cooling towers, pinpoints organisms that destroy effective performance and prescribes treatment that arrests these destructive organisms, as well as the application techniques.—THE MARLEY COMPANY.

771—Water Treatment — 4 p brochure points out company's 8-point water treatment coverage for elimination of scale, sludge, corrosion and impure steam. — IPCO LABORATORIES, INC.

774—Refrigerating Units — Bulletin 97-F illustrates and describes low-pressure refrigerating units. — FRICK CO.

ELECTRICAL

801—Motors—Bulletin describes and illustrates more popular a-c motors from 1 to 600 hp, for every process and manufacturing requirement. Single phase and polyphase; surpass NEMA specifications. — BROOK MOTOR COMPANY.

802—Small Relays—Simple solenoid design with only one moving part described in Bulletin 700. Silver alloy contacts need no cleaning, filing, or other maintenance. — ALLEN-BRADLEY CO.

805—Power Factor Correction — 24 page catalog 50B shows how you can cut power costs by installing correction capacitors on motors and other inductive electrical equipment. Greater loads can be handled from existing circuits. Wiring, transformer and switchgear costs can be greatly minimized in new installations.— SPRAGUE ELECTRIC CO.

813—600-Volt Wiring — How Anaconda Densheath 900 offers long life, high heat and moisture resistance, chemical stability and easy installation is described in Bulletin DM-5612 — ANACONDA WIRE & CABLE CORP.

820—Electrical Maintenance — New contract service (for Southeast only) inspects and tests motors, generators, gearing, control & distribution systems, etc., at a cost less than 1% of value of equipment. — Atlanta office of WESTINGHOUSE ELECTRIC.

874—High Voltage Rubber Cables — 32 p catalog contains information on design features, insulations available, and performance highlights of company's butyl rubber power cable, Durasheath. Also data on kinds of available constructions from 600 v to 15,000 v conductors. — ANACONDA WIRE & CABLE CO.

Late Bulletins

X-1—Thermal Vortex Burner — Bulletin 116, 4 p, illustrates and describes the Thermal vortex burner, designed for short flame combustion with a wide choice of fuels available. Operating characteristics are explained with diagrams. — THERMAL RESEARCH & ENGINEERING CORP., Conshohocken, Pa.

X-2—Corrosion Control — Bulletin No. 7102, 6 pages, "Licking Fretting Corrosion in Variable-Speed Sheaves" discusses the several ways in which wear by fretting corrosion can be controlled. — T. B. WOOD'S SONS CO., Chambersburg, Pa.

X-3—Gearmotors — Bulletin 51B-9172, 8 pages, describes design

(*Continued on Page* 119)

NEW Product Briefs

. . . there is always a BETTER WAY

Light-Operated Switch

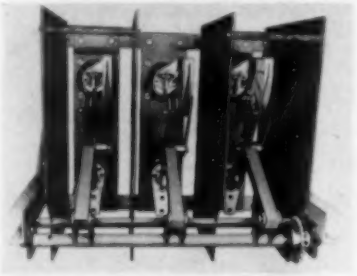
J-1 A compact and versatile light-operated switch, the Lightguard, is offered by **Schacht Electric Co.**, 1213 St. Emanuel, Houston 3, Tex.

Its small dimensions (one and three-quarter inches in diameter) and shape make it suitable for installation in lighting fixture canopies, outlet boxes, post lanterns, and within magnetic contactors and starter cabinets. The location of the light-sensitive element is variable, making the Lightguard adaptable to the fixtures of most manufacturers. It is designed to turn on at approximately one foot-candle and back off at ten. Currently manufactured models are suitable for tungsten loads up to 150 watts on 120 volt a-c circuits.

It is easily installable by drilling or punching a ¾" pipe size knockout in fixture canopy or electrical cabinet. A short three-inch adapter is available in steel or aluminum for mounting with wall brackets with shallow canopies.

Load-Break Switch

J-2 Introduction of a new frame-mounted, manually-operated load-break switch (Type LBS) which incorporates the functions of a disconnecting switch and a circuit interrupter for interrupting transformer magnetizing and load currents has been announced by **Allis-Chalmers Mfg. Co.**, Milwaukee 1, Wis.



The new three-phase, single-throw, gang-operated switch with a quick-break blade and arc chute interrupter is available as an unfused arrangement for housing in indoor cubicles. It is offered in ratings 4800 and 13,800 volts capable of interrupting 400 or 600 amperes normal load, and momentary values up to 20,000 and 40,000 amperes respectively.

Butterfly Valves

J-3 V-Port Butterfly Valves for precise controls of air or gas are available from **Hagan Chemicals & Controls, Inc.**, Box 1346, Pittsburgh 30, Pa.

Valves are of the rotating type to assure good control characteristics over a wide turndown range and are widely used on blast furnace and coke oven gas applications.

The vane, machined for close clearance, maintains a characterized relation, which approaches linear, between flow rate and angular rotation. Valves are cast iron, with 125-lb A.S.A. flanges, and are available in 4-inch, 6-inch, 8-inch, 10-inch and 12-inch sizes.

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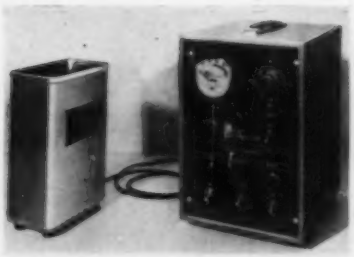


Ultrasonic Cleaner

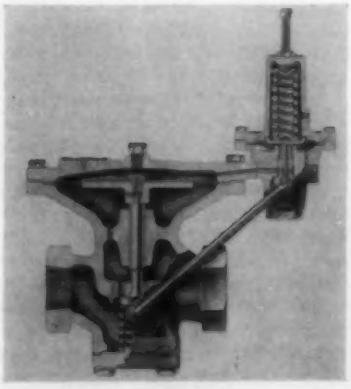
J-4 **National Ultrasonic Corporation,** 111 Montgomery Ave., Irvington, N. J., producer of a complete range of medium and high power ultrasonic cleaners, solvents, detergents and accessories, has announced a new unit for small part cleaning applications in which high energy density is required. Model 200 features a one-gallon heavy-gauge polished stainless steel tank with 43% of the bottom covered with driving elements. Actual radiating surface is 12 square inches.

The 115 volt a-c single-phase 60-cycle generator, designed for continuous operation, delivers an average power output of 60 watts and produces peaks of 240 watts.

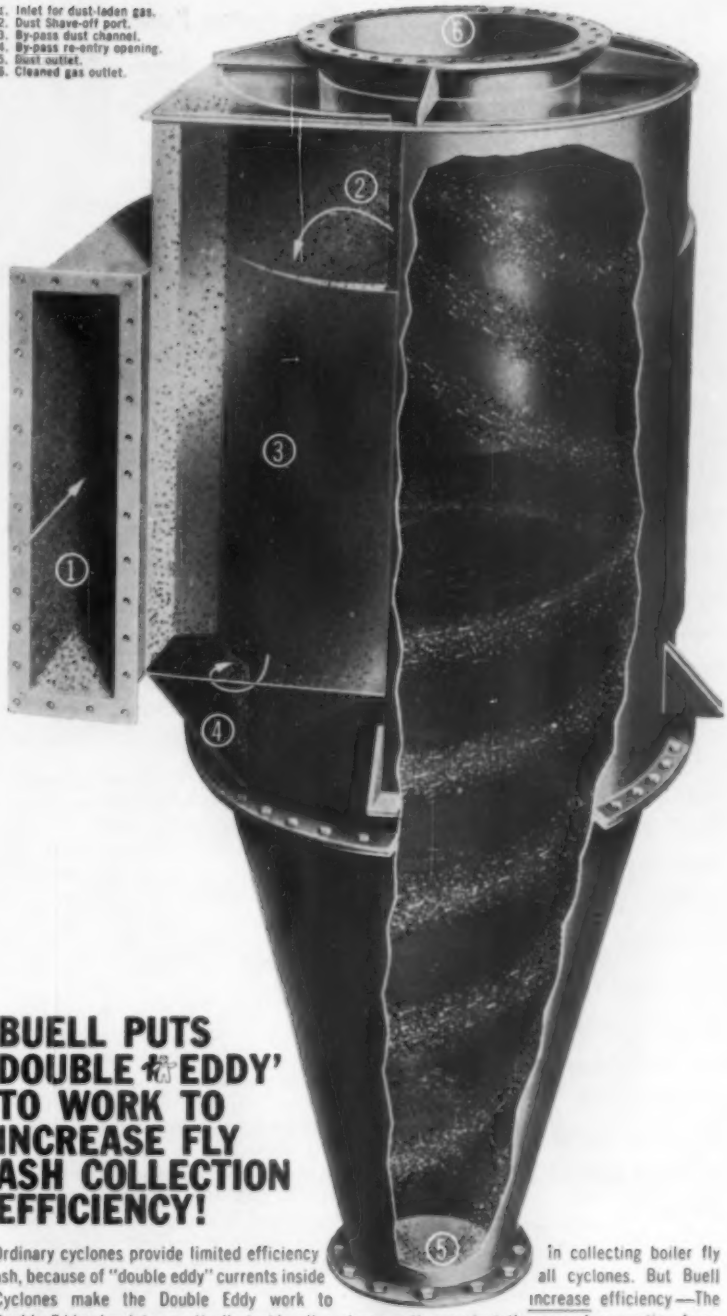
Reducing Regulator

J-5 A new pilot-operated reducing regulator is offered by **Mason-Neilan,** Nathan St., Norwood, Mass.

Designated Model 201-21, this reducing regulator is designed to provide accurate control of steam pressures for heating, process supply, and general plant use. It features an easily accessible external pilot, bolted directly to the main valve; stainless steel pilot and main valve; fast, accurate response to pressure changes; large capacity and tight shutoff.



1. Inlet for dust-laden gas.
2. Dust Shave-off port.
3. By-pass dust channel.
4. By-pass re-entry opening.
5. Dust outlet.
6. Cleaned gas outlet.



BUELL PUTS 'DOUBLE EDDY' TO WORK TO INCREASE FLY ASH COLLECTION EFFICIENCY!

Ordinary cyclones provide limited efficiency in collecting boiler fly ash, because of "double eddy" currents inside all cyclones. But Buell Cyclones make the Double Eddy work to increase efficiency—The Double Eddy circulates vertically inside all cyclones acting against the normal separating force of the spinning stream of gas and ash. Buell Cyclones have a narrow "Shave-off" port (2) at the top of the casing. This port catches and removes ash trapped in the Double Eddy. It makes the cyclone more efficient instead of less.—Only Buell Cyclones have the Shave-off. And only Buell Cyclones combine this efficiency with large diameter: they will not clog or plug even with loadings up to one pound of ash per cubic foot of gas. No field fitting is needed: they are completely assembled and match-marked before shipment. They can be completely lined, inside and out, against heat, corrosion and abrasion.—For a list of installations near you, a copy of our Catalog 103, or other information, call our nearest representative, listed in the telephone classified directories of most major cities under "Dust Collection Systems". Or write Dept. 80-J, Buell Engineering Company, Inc., 123 William Street, New York 38, New York. (European Subsidiary: Ambuco Limited, London, England.)

EXPERTS AT DELIVERING EXTRA EFFICIENCY IN DUST RECOVERY SYSTEMS: CYCLONES—"SF" ELECTRIC PRECIPITATORS—COMBINATION SYSTEMS—DRY CLASSIFICATION SYSTEMS.

buell®

$ $ $ For Your Ideas

SP&I presents each month helpful features, ideas, methods and procedures — many plant-tested in Southern and Southwestern industrial, power and service plants.

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material — a photo or rough sketch will make your idea more valuable.

Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

Southern Power & Industry
806 Peachtree St., N.E.
Atlanta 8, Georgia

Free-Piston Pump

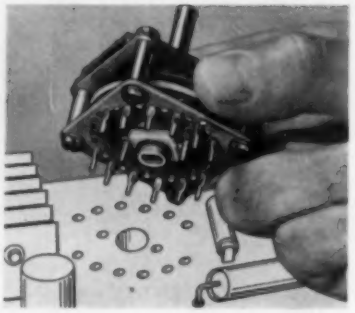
J-6 The Crossley Free-Piston Pump, with only 9 moving parts, will pump everything from molten metals to ice cream in 100% stainless steel non-contaminating chambers, according to the manufacturer, **Crossley Machine Co.**, Trenton, N. J.

The pump impels a continuous air-free flow without pulsating or surging. It requires no safety or relief valves; when a stoppage occurs, the pump stops. It can be operated with complete safety and efficiency submerged, or under any condition. There are no motors or engines, drive shafts, packings, seals, oils or greases.

The pump is operated by compressed air which is introduced into each cylinder in sequence; while the left cylinder is discharging, the center cylinder has filled and is waiting, and the right is filling. Chambers fill by gravity. In each chamber is a nylon free floating piston and two nylon ball valves. Operation is automatically controlled by a separate control box. Because one chamber can be stopped while the other two continue to function, the pump can operate indefinitely without being shut-down. It can be made in any size desired.

High Capacity Circuit Switch

J-7 Miniature precision rotary switches with special 0.031" diameter terminals that mount quickly in printed circuit boards up to 1/16 inch thick are available from the **Shallcross Manufacturing Company**, Selma, North Carolina.



Designed for extremely compact instruments, computers, and other electric-electronic equipment, the switches measure only 1¾" square and have a 1" back-of-panel depth (including 1/16" printed circuit board) for the first deck. They are available in both shorting and non-shorting types with 1 to 4 poles per deck and up to 32 positions per deck. These switches may be ganged up to 10 decks — only the last deck is furnished with printed circuit terminations, all other decks are standard miniature decks.

Two self-cleaning, self-aligning wiper arms with individual spring action provide uniformly low contact resistance of 0.0015 ohm or less. Solid silver alloy is used for all contacts, arms, and collector rings. Nominal contact breaking capacity is 5 amperes at 125 volts a-c.

Acid-Resisting Epoxy Resin

J-8 Concrete and metal pipelines can now be reconditioned in place by lining with acid-resisting epoxy resin, according to **Centriline Corp.**, 140 Cedar St., New York 6, N. Y.

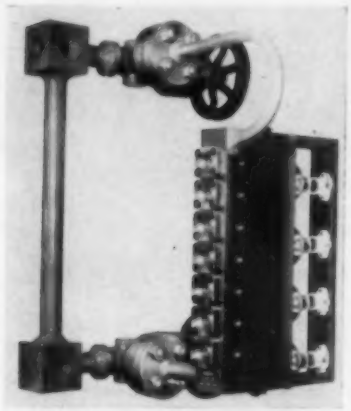
Pre-mixed epoxy resin is applied with special machines that travel through pipes from 24 to 144 inches in diameter. These machines apply lining material by centrifugal force from a high-speed revolving head, then smooth the lining with automatic trowels.

A variety of epoxy resin linings with a minimum thickness of one-eighth inch can be placed in a single pass. Linings consist of pure resins extended and pre-mixed with inert filler materials.

According to Centriline, epoxy resin provides a tight bond with pipe materials. Variation of extender ratios can produce a wide range of compressive and tensile results. Most common ratios produce compressive strengths of more than 7000 psi.

Water Level Gage

J-9 **Yarnall-Waring Company,** Philadelphia, Pa., has announced a new Yarway Color-Port Water Level Gage for boilers operating at pressures up to 1505 lb wsp.



This gage has been designed specifically for boiler applications in the medium pressure field. It is the individual port type, with cover plate assemblies that can be serviced or replaced in a matter of minutes with the gage in place. Exclusive spring loading maintains proper pressure on sealing gasket at all times. Port assemblies are completely interchangeable.

The Color-Port gives brilliant two-color readings. Steam shows red; water shows green.

Air Impactor

J-10 A new air Impactool, for tightening and removing nuts on bolts from 6" to 12" diameter with great power and speed, has been developed by **Ingersoll-Rand Company,** 11 Broadway, New York 4, N. Y. Known as the Size 599 "Super Slugger" Impactool, it is expected to have its greatest use in the manufacture and maintenance of very heavy machinery.

Since the tool is handled by a hoist or crane, it has been designed for easy positioning with eye-bolt suspension for either vertical or horizontal use. The Super Slugger Impactool eliminates laborious and time-consuming manual nut-running methods as well as burning, battering, and sledging of frozen nuts.

The tool, which is equipped for two-man operation, has a reversible motor and the ball and cam Impact Mechanism which has proven itself successful and safe on a wide range of other Impactool sizes.

HOT-DIP GALVANIZING by DIXISTEEL TRADE MARK

adds years of life to Iron or Steel

Nothing protects iron and steel from rust better than zinc. And nothing applies zinc better than hot-dip galvanizing.

Our modern equipment assures small, tight spangles . . . smooth, uniformly heavy coats of zinc . . . no burrs or fins! A tough, long-lasting barrier against rust and corrosion.

Call, write or wire for prices and information.

ONE OF THE SOUTH'S LARGEST HOT-DIP GALVANIZING TANKS

Accommodates pieces up to 45' long by double-dipping

OFFICIAL • INSIGNIA • HOT-DIP GALVANIZING

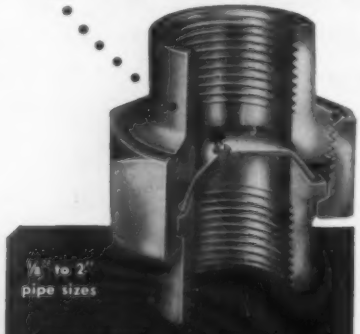
Atlantic Steel Company

P.O. Box 1714 • ATLANTA 1, GEORGIA • TRinity 5-3441

here's real **ECONOMY...**
time-saving **SIMPLICITY...**
and sure-fire **DEPENDABILITY**

for metering, measuring, controlling any piped material!

this Catawissa Cup-Orifice Plate CONVERTS any standard Catawissa Union into a ***GASKETLESS*** **ORIFICE UNION**



ELIMINATES the necessity of expensive gaskets... the uncertainty of what type gaskets are needed for specific temperature and pressure requirements... fumbling with extra parts!!!

Orifice Union problems of the past are gone forever! Stainless or carbon steel cup-orifice plate fits easily, quickly, securely to form a good, tight, leakproof seal. Temperature and pressure requirements are restricted only by the rating of the union itself (3000-lb. service, 9000-lb. test)!

Just specify "Catawissa Cup-Orifice Plates" or "Catawissa Cup-Orifice Unions" at your favorite supply store—or write for catalog and complete information.

CATAWISSA VALVE & FITTINGS CO.
CATAWISSA • PENNSYLVANIA

Flow Tube Meter

J-11 **Ellison Draft Gage Co., Inc.,** 548 W. Monroe St., Chicago 6, Ill., has introduced a highly practical flow tube meter designed for measuring the flow of air, gas, water, oil or other liquids or steam, through ducts, or piping of any diameter. Gages employing either Mercury or Oil are available in 10", 12", 20" or 30" scales.

Needle valve equalizer fittings are available with the flow meters for differential static pressures above scale range. Orifice flanges with adjustable orifice plates are available for use with flow meters.

Portable Air Hoists

J-12 To conserve time, reduce operating costs, and remove pressure from the busy shop crane, **Ingersoll-Rand Company,** 11 Broadway, New York 4, N. Y. has developed two new lightweight, portable, air hoists, designed to be easily moved and installed by one man.

The 1000-pound capacity hoist weighs 39 pounds and lifts its rated load at 45 feet per minute. The 2000-pound hoist weighs 56 pounds and lifts its rated load at 22 feet per minute.

The hoists are streamlined in appearance with a lightweight, aluminum alloy housing which measures 12½ inches in overall length, 5¼ inches in diameter and takes up little headroom.

A mechanically operated brake is automatically applied whenever the controls are released. If the air supply should be shut off, the lowering of the load may be controlled by the brake. Safety-up-and-down stops prevent damage to the hoist from overrun of the chain in either direction.

For easy operation and smooth control, a rotary throttle valve, operated by a control arm shaft mounted on needle bearings, gives graduated control for accurate spotting of the load.

The lubrication system is built-in for complete protection of the motor and gearing.

Standard equipment includes pull-chain throttle and ball bearing swivel-mounted safety top and bottom hooks. Optional are pendent throttles, chain buckets to collect the loose chain loop, and hook-on or rigid type ball bearing trolleys for standard I-beam sections. The hoists are available with either roller or link chain as desired.

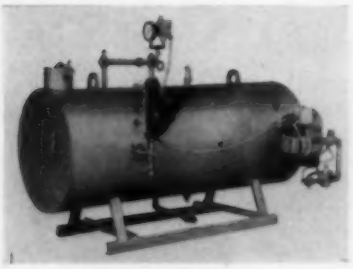
Whirlex Forced Draft heavy duty fans are designed for service in all types of boiler and industrial applications. Special design airfoil impellers provide maximum static efficiency. All-welded housing construction allows for a dust-proof, leak-proof operation.

Whirlex Induced Draft heavy duty fans are available with either straight or evase type self supporting stacks. Special shaft cooling sleeves allow for the efficient use of air cooled bearings. Water cooled bearings can be furnished if desired.

Write for complete information on these and other types of Whirlex industrial fans.

Fly Ash Arrestor Corp.
201 N. 1st Street
BIRMINGHAM, ALA.

WHIRLEX



Fire-Tube Boiler

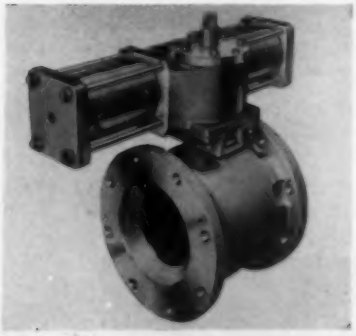
J-13 A new 10-hp (100-125 lb W. P.) horizontal fire-tube boiler for oil or gas firing, offered by **Lookout Boiler & Manufacturing Company.** Chattanooga, Tennessee, is completely automatic and self-contained. Its unique side-firing design provides high output in a small package without sacrificing capacity, quality, or safety.

Turbulent gas flow results in additional heat being absorbed by the water. Because all tubes are below the water line, corrosion is eliminated at this potential trouble spot.

Ball Valves

J-14 **Jamesbury Corp.**, 148 New St., Worcester, Mass., has announced that its "Double Seal" Ball Valves are performing efficiently and economically in industry because of several factors.

Among these are zero leakage assured by the proportioned resilience of the Teflon seats and seals on both sides of the ball. Full flow is another key performance feature. When the valve is opened, the wiping action of the ball automatically removes any sediment that may have adhered to the ball's surface while the valve was shut. Then, rugged construction and corrosion resistant materials used throughout the valves guarantee long life. The valve wipes itself clean, needs no lubrication, and is built to withstand high pressures and blowing shock.



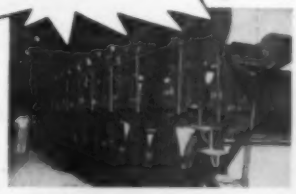
THE MAGIC OF *Norgren* MICRO-FOG LUBRICATION

OIL CONSUMPTION CUT 80%

Charlotte Pipe & Foundry Eliminates Costly Oil Circulating System

Four machines for centrifugally casting soil pipe converted to Micro-Fog Lubrication. Results: • Saved 216 gallons of oil a week. • Bearing temperatures reduced 10°-20° F. • Ended flash fires resulting from oil leakage. • Eliminated four ¾ hp pumps on oil circulating system.

BEARING TEMPERATURES REDUCED 8°-10° F



St. Regis Paper Co., Pensacola, Ends Paper Losses Due to Oil Leaks

174 bearings on paper machine dryer sections converted to Micro-Fog Lubrication. Results: • Micro-Fog Lubrication by far the most thorough. • Reduced lubrication system maintenance. • Less lubricant consumed. • Ended paper losses due to excessive lubrication. • Bearing temperatures cut 8°-10° Fahrenheit.

HAND OILING AND GREASE DRIPPAGE ENDED

Erwin Mills Converts 3 Dry Can Stacks to Micro-Fog

Results: • No significant bearing wear in 12 months operation. • Bearing temperatures reduced approx. 10° F. • Costly hand lubrication of bearings ended. • No lubricant dripping from bearings. • Big savings in lubricant and maintenance costs.

For complete information WRITE FOR DESCRIPTIVE LITERATURE.

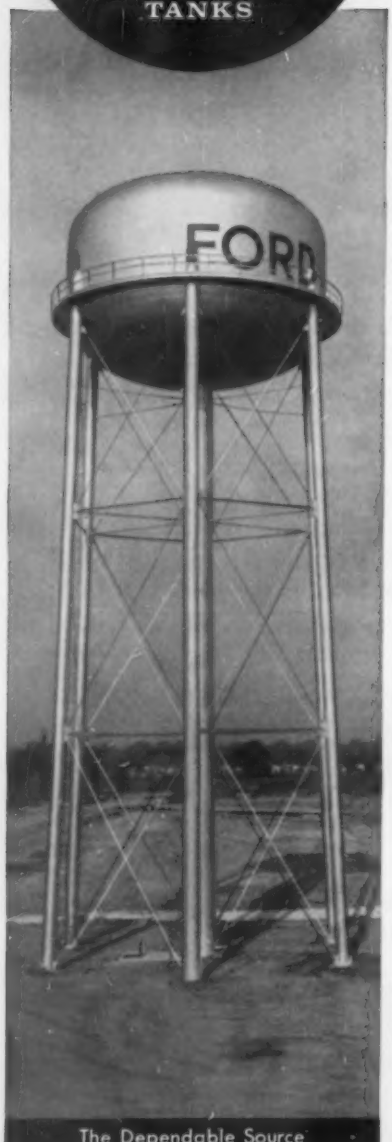
C. A. NORGREN CO.

3463 SO. ELATI STREET • ENGLEWOOD, COLORADO

INDUSTRIAL PLANTS RELY ON

GRAVER

ELEVATED WATER TANKS



The Dependable Source

GRAVER TANK & MFG. CO.

DIVISION—UNION TANK CAR COMPANY

EAST CHICAGO, IND.

Plants and Offices Across America

Protective Glove

J-15 An extra-feature protective glove for those who work with high voltage is Hi-Visibility "Red 'N Black" Glove for linemen is available from **Charleston Rubber Co.**, 50 Stark Industrial Park, Charleston, S. C. This new glove has a black exterior and a bright red interior. It is made of pure natural rubber by the standard multiple dip cement process, but instead of a constant series of dips in black rubber solution, the first series is in red rubber solution. This series is followed by a finishing series of dips in black. It is available in regular styles, also in the curved hand and contour cuff styles.

The manufacturer points out that the "Red 'N Black" glove has its own built-in warning feature, which makes damage detection easier in field or laboratory inspection. If any significant damage to the glove has resulted from snagging or cutting, the black exterior is penetrated, and the Hi-Visibility red interior then flashes its warning that the damage is substantial in depth.

Other special features of the "Red 'N Black" glove for linemen are that the bright red interior helps prevent inadvertent and potentially harmful reversal of gloves in use and storage. Also cleanliness and care are promoted, because the red interior makes it easy for the wearer to notice and wash off accumulated, unhealthful soil. Too, the Hi-Visibility red roll at the cuff signals at a distance that the gloves are in use.

Surge Control System

J-16 **CDC Control Services, Inc.**, 776 So. Warminster Rd., Hatboro, Pa., has announced a new, fast-responding CompuDyne Surge Control System for large compressors, blowers, and exhausters which improves the operating stability, reduces power consumption, and increases the safe output of such equipment. With the system, compressors can be safely operated nearer the surge point than was before possible. Unchecked surging can quickly damage or destroy a compressor.

Adaptable to every mode of compressor operation, the CDC system can be used on units from 50 hp up. It is a highly flexible, completely packaged system providing complete safety at any level of compressor operation.

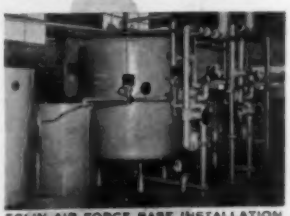
The system consists of fully-electronic sensing, measurement, and control instruments, plus an electro-hydraulic or electro-pneumatic actuator and control valve as the final control elements. The electronic instrumentation eliminates signal lags, and the resulting sensitivity permits compressors to be operated as close as possible to the surge point with consequent gains in output.

Multi-Switch Indicator

J-17 A new Multi-Switch Indicator has been announced by the Wheelco Instruments Division of the **Barber-Colman Company**, Rockford, Illinois.

For rapidly checking temperatures at many points, the 9000 Series Multi-Switch Indicator is available with switching details that allow the instrument to be used for as many as 108 stations. Additional stations may be added by the use of an additional switch housing cabinet. The basic instrument is a completely self contained, null-balance unit and requires only the external sensing devices.

TO SOFTEN WATER
TO CONDITION WATER



EGLIN AIR FORCE BASE INSTALLATION

Above is a heavy duty, fully automatic, double unit softener, designed to supply uninterrupted soft water service.

One of the many softeners and conditioners designed and manufactured by Southern Water Conditioning, Inc. For further data, specifications, bids, or surveys, write to Southern Water Conditioning, Inc., 301 15th Avenue South, St. Petersburg, Florida.

All types of Domestic, Commercial, and Industrial Water Softening and Conditioning Equipment: Filters - Taste and Odor Removers - Aerators - Demineralizers - Zeolite, Ion Exchange Minerals in stock - Residential and Commercial Package Swimming Pool Filters - Also Rebuilding and Modernizing.

Southern Water Conditioning, Inc.
301 15th Avenue South
St. Petersburg, Florida

SOUTHERN

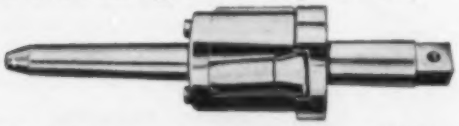
Keep boilers on the line with

WILSON Maintenance Tools

Heavy-duty air driven tube cleaners

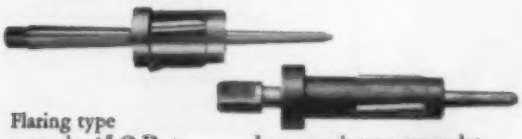
Designed to deliver maximum power at the most efficient cutter head speeds while negotiating sharp bends, the Model ECT Air Cleaners are excellent for cleaning curved boiler tubes from 2½" to 4½" O.D.

Self-feeding tube expanders



Wilson Model 38 tube expanders are self-feeding and parallel expanding. They are of the single flare roll type. Available for tubes 1" O.D. to 4½" O.D. with various roll lengths for tube seats ¾" and up.

Model E Expanders



Flaring type expander 1" O.D. to 4½" O.D. tubes, ½" to 2" tube seats

Long reach type expander 1" O.D. to 4½" O.D. tubes, 2½" to 5" tube seats

Right angle bevel gear drive

This Wilson bevel gear drive is expressly manufactured to meet continuous and heavy duty service conditions. The one piece all steel body is extremely rigid and not subject to distortion. The maintenance of perfect gear alignment is assured with consequent long service life.

Write today for your copies of Wilson Tube Cleaner catalog No. 77 and Wilson Tube Expander catalog No. 88.

Representatives in principal cities

Thomas C. Wilson, Inc. • 21-11 44th Ave., Long Island City 1, N. Y.

Cable address: "Tubeclean", New York

WILSON TW870

TUBE CLEANERS • TUBE EXPANDERS

MERCURY-TO-MERCURY SWITCH
requires no service—contacts never pit, burn or corrode.
PERMANENT ALNICO MAGNET
links water level with electrical controls; prevents failure of mechanical linkages.
CORROSION-RESISTANT FLOAT
is made of 304 Stainless Steel for long, trouble-free service. Can also be made of special materials for exterme local conditions.
NO-SCALE FLOAT CHAMBER LINER
"flexes" off scale; prevents float "sticking".

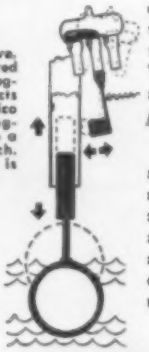
Here's "Low Maintenance"

BOILER SAFETY

MAGNETROL

BOILER WATER LEVEL CONTROLS

"Blow-down" the float chamber once-a-shift; inspect the switches once a month—that's all you have to do to keep a Magnetrol in tip-top *safe shape*. It's made that way. The secret is all in the simple magnetic operating principle *as pioneered and perfected by Magnetrol.*



A magnetic sleeve, raised and lowered within a nonmagnetic tube, attracts or repels an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

Standard Magnetrol Units are available for pressures to 600 psi and temperatures to 750°F., for single or multi-stage control with as many as three separate switching actions. Also special units for more extreme requirements. For full details, mail coupon.

MAGNETROL, Inc.

MAGNETROL, INC., 2118 S. Marshall Blvd., Chicago 23, Ill.
Please send Catalog Section III with full information about Magnetrol Boiler Water Level Controls. 10

Name_____

Company_____

Address_____

City_____ Zone____ State_____

Low Voltage Unit Substation

J-18 A new low-voltage Power-Zone package unit substation for use on 480 volt systems to supply 120/208Y circuits is available from **Square D Company.**

6060 Rivard St., Detroit 11, Mich. Designed for lighting, office equipment and similar loads, the substations contain three-phase transformers from 75 kva to 300 kva. Up to 72" of panel space is available for molded case circuit breakers.

Compactly built, the substation is only 60" long, 36" deep, and 79½" high. These dimensions provide easy movement through commercial doorways and minimize installation space. Where space is critical, substations may be installed against the wall.

The open-ventilated dry-type transformers are designed for quiet operation. Sound levels have been reduced to 45 db for sizes up to 150 kva, 52 db for 225 kva, and 56 db for 300 kva.

Brake for Pallet Trucks

J-19 A new, shoe-type brake is now available on hand pallet trucks, it was announced by **Stokvis Multiton Corp.**, 18 Secatoag Ave., Port Washington, N. Y.

The Multiton brake is controlled by the pallet truck's steering handle and employs a lined brake shoe which acts against the steering wheels. It is available, as optional

equipment, on all hand pallet trucks in the Multiton line.

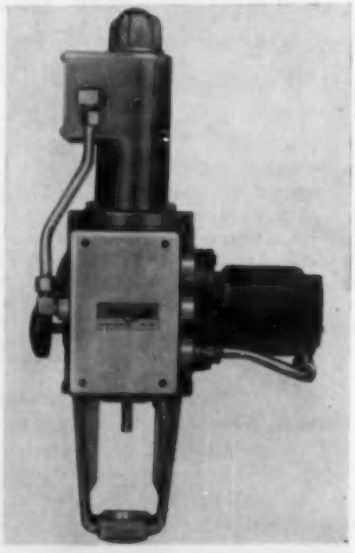
Outstanding feature of the new brake is its ability to slow the pallet truck gradually, or stop it instantly and smoothly. The Multiton brake operates in this positive manner, without marring floor surfaces, because its braking action is evenly applied to the truck wheels, not to the floor itself.

The new brake may be securely set as a safe parking brake while the truck is at rest; when desired, it may be completely deactivated.

All-Electric Actuator

J-20 A new all-electric actuator is available from **Conoflow Corporation**, 2100 Arch St., Philadelphia, Pa., providing economical automatic or remote manual positioning for throttling control of many types of valves, dampers, louvres, metering pumps, and speed changers. It can also be used for on-off remote pushbutton control with optional position indication.

The Model D-62XW affords precise proportional positioning by means of a slidewire feedback used in conjunction with one of several voltage balance systems now on the market.



UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES:

- No Loose Parts
- Free End Float
- Visual Inspection While Running
- Smooth Continuous Drive
- Original Balance for Life

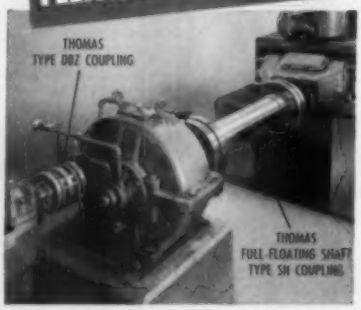
Costly down-time, bothersome maintenance and interrupted schedules are eliminated when Thomas Flexible couplings are installed.

Over forty years of flexible coupling experience is at your disposal.

Thomas Flexible Couplings are made to your requirements.

Full range of shaft sizes. Ratings to 40,000 HP or more. Speeds to 50,000 RPM.

PROTECT Your Machinery with THOMAS ALL METAL FLEXIBLE COUPLINGS



NO MAINTENANCE
NO LUBRICATION
NO WEARING PARTS

Write for Engineering Catalog 51A

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.

(*Continued from Page 109*)

and construction features of gearmotors from ¼ to 100 hp. Covers integral and all-motor types including right angle as well as special designs for particular needs. — ALLIS-CHALMERS MANUFACTURING COMPANY, Milwaukee 12, Wis.

X-4—Belt Conveyors — Book 2779, 40 pages, is a practical handbook on the use and selection of standardized Pre-Bilt sectional belt conveyors, which are adaptable to a variety of applications and operating conditions. Components and accessories are listed, with detailed engineering and selection data. — LINK-BELT COMPANY, Dept. PR, Prudential Plaza, Chicago 1, Ill.

X-5—Oil and Gas Burner — New 6-page folder illustrates and describes construction features and principle of operation of mechanical pressure atomizing oil and nozzle-mix gas burner, with which the company's automatic "package" boiler is equipped. Views of the system are shown in detail and labeled for easy identification and instruction. — BOILER ENGINEERING & SUPPLY CO., INC., Phoenixville, Pa.

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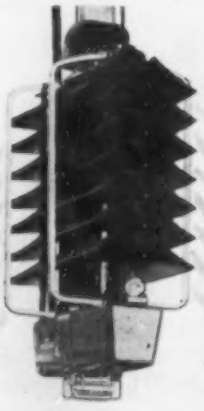

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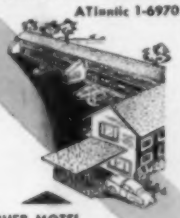

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